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Notes and Comments

The Colour Users' Association

THE thirteenth annual meeting of the Colour Users' Association at Manchester on Tuesday afforded Sir Henry Sutcliffe Smith, who has occupied the chair for eleven years, an opportunity of reviewing the work of the Association during the past twelve months and the position of the colour using industries in the light of political and economic events. The past twelve months have probably been more eventful than any of the previous years during which he has been chairman. When the Association met last year, the Dyestuffs (Import Regulation) Act 1920 had been in operation for an extended period of six months beyond the original ten years provided for under that Act, and this extension had only gone through after considerable controversy on the part of the different interests concerned. Even amongst users there was not unanimity as to whether the Act should be extended or not, but events have moved rapidly since then and the economic outlook has been entirely changed by the adoption of protection by the Government. Not only have users now to face the difficulties arising out of a prohibition Act, but the 10 per cent. revenue tariff has been applied to all imported dyestuffs—dyestuffs which are not made in this country—and further the chief British and Continental makers have linked themselves together in a price cartel. These matters, Sir Henry discussed in detail in the course of his address.

During the year the council has been depleted by the death of two important members, Mr. T. N. Grant and Mr. Philip Marsden. Mr. Grant had been a member of the council since 1921 and was also one of the Association's representatives on the Dyestuffs Advisory Licensing Committee, and Mr. Marsden had been a member almost since the council was formed. Their work was of great value to the Association and both had earned the respect and esteem of every member. Their passing is a distinct loss to the Association. Notwithstanding his daily activities, Mr. Ellis Green, secretary of the Association, had the distinguished honour of being elected last November as Lord Mayor of Manchester. Sir Henry congratulated Mr. Green on this distinction. During the secretary's temporary absence the staff had maintained the traditions of the past and had acted in a thoroughly efficient manner.

Tariffs on Imported Dyestuffs

SIR HENRY SUTCLIFFE SMITH laid the whole of the colour using industry under a debt of gratitude for his able exposition of the present political situation from the industry's point of view in his presidential address at Manchester on Tuesday. The colour users of Great Britain, as represented by the Colour Users' Association, has, as Sir Henry pointed out, two main grounds for requesting the withdrawal of the 10 per cent. tariff on imported dyewares: (1) That the Dyestuffs (Import Regulation) Act is in operation, and (2) that an international cartel, including the two leading British makers, has been formed and is now in operation, whereby the British users' privilege of buying at the world's lowest prices is now in jeopardy. It must not be forgotten that the establishment of the dyestuffs industry in this country has been achieved only at the expense of many millions of pounds to British colour users who have loyally endeavoured to carry out the spirit of the Government pledge entered into during the negotiations prior to the passing of the Dyestuffs Act in 1920.

The Government pledge was summarised in the following terms: "It is the settled opinion of the Government that for national security it is essential that synthetic colour-making factories should be in existence and be maintained in operation with their staffs of chemists and other experts in this country, and that the equipment should be equal in extent to that of any other possibly hostile nation. It is the settled opinion of the Government that this should be brought about without placing the textile and other colour-using industries in an unduly disadvantageous competitive position."

The Case for their Withdrawal

AN outline of the reasoned case submitted by the Colour Users' Association to the Tariff Advisory Committee in calling for the immediate withdrawal of the 10 per cent. revenue tariff on imported dyestuffs was given by Sir Henry Sutcliffe Smith in the course of his address. The statement pointed out that throughout the period of the Dyestuffs Act the high cost of dyewares has been a serious matter for the users, and this has been referred to by the chairman of the Colour Users' Association in his annual address since 1922. The effect of these high prices upon the using industries was also stressed in the report of the Colour Users' Association included in the Development Committee's Report to the Board of Trade in 1930. The imports of dyestuffs consist almost entirely of dyestuffs which are not made in this country and which are vital for the textile industry, particularly the export section, comparatively few imports being on price grounds. These necessary imports—the raw materials of the textile trade—are already burdened with the extra cost in consequence of the abandonment of the gold standard. A further tax of 10 per cent. is an additional cost in

the production of textile goods for the export trade, which already is suffering from the competition of cheaper production in foreign countries because of their cheaper labour, longer hours, and less taxation. Figures showing the exports of printed and dyed cotton goods demonstrate how necessary it is that no additional barriers should be placed in the way of endeavouring to regain our pre-war volume of yardage. The British makers supply 90 per cent. of the British users' requirements; all imported dyestuffs are types that are not made in this country and are as numerous as the full British range.

Great Britain in pre-war days always enjoyed the world's lowest current prices for dyestuffs, and a continuation of this was a condition agreed to by the British makers when they asked the users' support for an extension of the Dyestuffs Act. In 1931 the British makers entered into a cartel with the Interessen Gemeinschaft and the Swiss makers, and in 1932 British prices have already been raised from 20 to 40 per cent. The users of dyestuffs have, therefore, to face (1) the Dyestuffs Act, (2) an international price cartel and (3) a tariff of 10 per cent. It was not anticipated when the extension of the Dyestuffs Act was agreed to, that the British makers would then enter into a cartel controlling prices with foreign makers, whereby the users lose the benefit of access to the world's production and the world's lowest prices. Foreign makers in the cartel, practically the users' only alternative sources of supply, refuse to quote for similar products to those made in Great Britain.

Commerce as a Profession

THE Parliamentary Secretary to the Board of Education lives, while he holds that distinguished office, in an atmosphere which, whatever its qualities, is not conducive to the growth of healthy economic notions. We are, therefore, not surprised to find Mr. H. Ramsbotham, M.P. delivering an address to the Conference of Commercial Teachers at Balliol College, Oxford, and pleading for "the elevation of commerce to the status of a profession." We can understand the delight with which all the pundits of the Board of Education, assembled no doubt at the public expense in the congenial surroundings of Balliol College, would listen to this high-falutin' rubbish. For our part we prefer to think that things would be better if the professions could be elevated to the status of commerce. At all events we are entitled, perhaps not to complain, but at least to smile when these professional bureaucratic hangers-on to commerce have the impertinence to claim a status and a precedence which they cannot in reason and do not in fact possess. Commerce is the life-blood of this nation. It is carried on by the people upon whom the whole of the rest depend. It furnishes all of us with our livelihood, and in particular it pays the fees, generally as a first charge, of what are strangely known as the professions.

Mr. Ramsbotham should think the subject out again. He might render a service by following up the line of thought suggested in Lord Hewart's "New Despotism." He might call attention to the grave danger to our economic life in the inordinate growth first of all of a bureaucracy to thwart and hinder commerce, and next of a professional class, a sort of unofficial bureaucracy, the lawyers and accountants who in the name of professional status are rapidly becoming the agents of the bureaucracy and a hindrance instead of a help to the development of trade.

Papers at the A.C.S. Meeting

A SYMPOSIUM on the physical chemistry of metals is being arranged by the Division of Physical and Inorganic Chemistry of the American Chemical Society at the Society's meeting at Denver, Colorado, on August 22-26. On this occasion fifteen papers on the design, construction and operation of large scale equipment in which a chemical reaction takes place will be presented before the Division of Industrial and Engineering Chemistry, of which Professor D. B. Keyes, of Illinois University, is chairman. Whilst there has been considerable material published in the last twenty-five years on the design, construction and operation of equipment in which physical reactions take place, for example, filtration, distillation, evaporation, grinding, etc., there has been very little discussion regarding equipment in which an actual chemical reaction takes place, such as oxidation, reduction, nitration, sulphonation, chlorination, esterification, pyrolysis, condensation, etc. The chemical engineer working in the industry has therefore found it extremely difficult to obtain satisfactory data to help him in the design and operation of such equipment, but the papers to be presented at the Denver meeting have been planned to develop creative effort in the literature of this field.

"Industrial coatings related to paint and varnish and primers and protective coatings for special metals," will be the subject discussed at the meetings of the Division of Paint and Varnish Chemistry. The Division of Colloid Chemistry, headed by E. O. Kraemer, research chemist to the du Pont Co., is sponsoring a symposium on flotation in the course of which energies of immersion, wettability, adsorption by powders, and related subjects will be dealt with. The presentation of awards will take place on August 24 when the president of the society, Dr. L. V. Redman, director of research to the Bakelite Corporation, will deliver the annual presidential address on "Some Economic Aspects of Research."

Vitamin C

THERE is evidence that vitamin C may soon be isolated chemically. This vitamin is the one which prevents scurvy and is present in lemon and other juices, conferring on them their anti-scorbutic properties. In 1927 Professor Szent-Györgi obtained a complicated substance named hexuronic acid while working in the Biochemical Laboratory at Cambridge. It is found in relatively large though absolutely small concentrations in the suprarenal glands of animals. Guinea-pigs fed on a basal diet which does not contain the anti-scorbutic factor die with severe symptoms of scurvy in about thirty days, but if hexuronic acid is added to such a diet they remain healthy and gain weight consistently. The chemical constitution of hexuronic acid is being investigated by Dr. Hirst and Mr. Reynolds in Professor Haworth's laboratory at Birmingham. The acid is a cream-coloured crystalline powder which melts and decomposes at about 185° C. Its structure is now being elucidated so that the acid may be produced synthetically, and some progress in the first part of this research is already reported

British Colour Users and the Tariff Situation

Sir Henry Sutcliffe Smith's Presidential Address

THE thirteenth annual general meeting of the Colour Users' Association was held at Cromwell Buildings, Blackfriars Street, Manchester, on Tuesday, July 26. Sir Henry Sutcliffe Smith presided and was supported by Mr. Arthur K. Davies, president of the association. In his address as chairman of the association, Sir Henry Sutcliffe Smith reviewed the political and economic situation as affecting the users of dyestuffs and stressed the need for some relief from the burdens which at present press heavily upon the industry which is represented by the association.

SIR HENRY SUTCLIFFE SMITH, in his presidential address, said that following the usual precedent the Board of Trade, in response to an application by the association under the Safeguarding of Industries Act, again extended the period of exemption of oxalic acid from the safeguarded list, the order to remain in force until December 31 next. This important chemical, however, was now subject to 10 per cent. tariff, notwithstanding that it was not manufactured in this country. In the dyeing industries this chemical was used primarily in the dyeing of goods for export, and this was an instance where discrimination should be shown because the tariff was an added cost to the production of goods for export, apart from the incidence of the increased cost following the abandonment of the gold standard. As compared with last year, the price had advanced 66 per cent. British users were thus being handicapped by the lack of a scientific tariff, as it seemed to be unreasonable to increase the cost of the raw materials of an important export industry, particularly so where the commodity in question was not manufactured here.

The Dyestuffs Industry Development Committee, appointed under the Dyestuffs (Import Regulation) Act, 1920, to advise the Board of Trade as to the efficient and economical development of the dye-making industry, he said, consists of representatives of both dye makers and users, as well as representatives of the War Office, Board of Trade and the Department of Scientific and Industrial Research. Much was expected from this committee, but unfortunately its operations are limited owing to its lack of executive power. No doubt since the formation of the cartel between the leading British and Continental makers, the need for this committee is not so great as it was. Two years ago, however, the committee issued a valuable report showing the progress of the British dye making industry, and it would be useful if that report were now revised and brought up to date, particularly in the light of the new developments of the British industry under the regime of protection and of a cartel.

The Users' Point of View

The users' point of view is one that should be emphasised, particularly in regard to the economic aspects of prices of dyestuffs ruling in this country compared with leading textile competitive countries on the Continent. The committee could do useful work on similar lines to that done by the association a few years ago when a close inquiry was made in regard to the ruling prices of dyestuffs in all competitive countries on the Continent. It is vital that under the extreme form of protection now applied to dyestuffs that the users' position should be ascertained in regard to the prices they are now called upon to pay for dyestuffs in comparison with their foreign competitors. Otherwise, without that knowledge they may be placed in a disadvantageous competitive position in the export section of their industry.

Sir Henry said it was gratifying to see the marked increase in the production of British dyestuffs, and he congratulated the makers on the progress made. The statistics compiled by the Board of Trade showed a total production of 47,980,794 lb. in 1931 as compared with 42,590,243 lb. in 1930, an increase of 12½ per cent. The production figures in the following table showed the extent of the progress made since 1922, and gave some indication of the strong position attained by the industry since the inception of the Dyestuffs (Import Regulation) Act :—

	lb.	Index figure.
1913 ...	9,114,134 ...	100
1922 ...	20,801,563 ...	228
1923 ...	33,100,716 ...	363
1924 ...	33,242,704 ...	365
1925 ...	32,663,402 ...	359
1926 ...	30,207,000 ...	332
1927 ...	39,551,750 ...	434
1928 ...	50,607,080 ...	559
1929 ...	55,785,032 ...	612
1930 ...	42,590,243 ...	467
1931 ...	47,980,794 ...	526

An analysis of the dyestuff production figures showed a general all round increase in output, each class of dyestuffs, with the exception of vat colours and indigo, sharing in this increase.

A Definite Step Forward

Production figures alone did not show the progress made by the British dyeware industry. Each year saw new colours placed on the market, and although the greater proportion of those represented types previously imported, there was a definite step forward in the right direction. There was a growing demand for a range of fast, direct cotton colours. Where fastness to light was of paramount importance, it was only possible to-day to satisfy customers' requirements by the use of vat dyes. Unfortunately, vat dyeing costs were far too high, and the production of a full range of fast direct dyes would be of inestimable benefit.

The progress to which he had referred owed much to the continuous exercise of research activities an important feature of which was the close contact established between the research department of the dyestuffs section connected with the principal British manufacturing organisation and the Universities. This contact could not fail to be fruitful in the development of new products and should prove advantageous both to the manufacturers and the educational institutions concerned.

Several members have complained of serious delays in delivery of various classes of dyestuffs, particularly the vat series. Under present conditions in the textile trade, any delay in delivery of raw materials was likely to have serious and far reaching results, and it was only reasonable to claim that the users must have access to full supplies of dyestuffs without any such delay. He was aware that the makers had experienced considerable difficulty in endeavouring to keep pace with the increased demand, and that they had made strenuous efforts to avoid delay, but unfortunately these efforts had not met with the success hoped for by the users. One of the conditions of the users' acquiescence in the removal of the foreign counter product from the non-contentious list, was the full and free supply of the British product, and until the British makers could give a definite assurance that they were able to meet all demands promptly and satisfactorily, there should be available without let or hindrance stocks of foreign colours to meet the users' immediate requirements.

The value of the total exports of dyestuffs and intermediates in 1931 was the highest ever recorded, and shows the gratifying increase of nearly 15 per cent. over 1930.

Researches on Coal-Tar Intermediates

Researches on coal tar intermediates carried out by the Department of Scientific and Industrial Research in its chemical laboratory at Teddington, under Professor G. T. Morgan, had led to the design and construction of a semi-works scale ether extractor which was being successfully used on a works scale by L. B. Holliday and Co., Ltd., of Huddersfield. This adaptation of the Teddington extractor had been so successful that the company was shortly putting it to further use in the manufacture of resorcinol, a valuable intermediate which had hitherto been imported in considerable quantities from abroad. He attached great importance to the subject of research, which ought to be watched with the utmost diligence. They had gone through a great deal to establish the dyemaking industry on a basis comparable with the best in the world, but if British makers were gradually to buy more and more intermediates from abroad and make less and less themselves, they would eventually lose enthusiasm for research, efforts would be relaxed more and more, and reliance would be placed on the foreigner for the

introduction of new things. This would eventually land them where they were at the initiation of the Dyestuffs (Import Regulation) Act. Therefore, the advances to which he had referred were to be welcomed.

Dyestuffs (Import Regulation) Act, 1920

The Dyestuffs (Import Regulation) Act was extended for a further period of twelve months from December 31 last. The definite view of the council, as expressed previously, had been that the Act had entirely achieved its purpose, and it was no longer necessary that it should be continued. As a result of the general election, however, the whole outlook had been changed, and the necessity for curtailing imports to redress the adverse trade balance brought the question of tariffs to the fore. In view of the special circumstances prevailing at the time, the Council passed the following resolution: "The Colour Users' Association consider that any tariff on dyewares—one of their important raw materials—would be prejudicial to their industries, and whilst not receding from their declaration regarding the Dyestuffs (Import Regulation) Act, they agree that in present circumstances a continuation of that Act for a further twelve months would be preferable." He was voicing the view of the association in suggesting that the revenue tariff of 10 per cent. should be withdrawn, as the Dyestuffs Act gave adequate protection to the industry and the only dyestuffs that were allowed to be imported were such as were not made here.

Immediately it became known that under the Import Duties Bill dyestuffs were to be subjected to a tariff of 10 per cent., close investigation was carried out in order to ascertain as far as possible the effect of the colour using industries. Serious thought was given to this question, and a memorandum was compiled and forwarded to the Tariff Commissioners, requesting that dyewares be placed on the free list. The textile industry was in an unfortunate state of depression, and for a struggling industry to have to bear extra costs of a tariff on its necessary raw materials was an injustice which could not be lightly passed over. Foreign dyewares on which the 10 per cent. duty was imposed were not manufactured in Great Britain, and therefore no benefit could accrue to any other British industry by the operation of such a tariff, and there was therefore ample justification in asking for the removal of this extra burden. Foreign dyestuffs, such as were imported to-day, were vital for the textile industry, particularly the export section, and a further tax of 10 per cent. was an additional cost to a trade already suffering from the competition of cheaper productions in foreign countries. In view of the extra costs already incurred in consequence of the abandonment of the gold standard, the substantial increase in prices of British dyewares following on the establishment of an international cartel, and the continued operation of the Dyestuffs (Import Regulation) Act, he pleaded for the withdrawal of the tariff on imported dyestuffs. The council would welcome an opportunity of meeting the Import Duties Advisory Committee on this question, and an official request for such a meeting had already been made.

The Situation To-day

In February it was announced that an agreement had been concluded between the principal German, Swiss, French and British dyestuffs manufacturers, the intimate terms of which, of course, had not been disclosed. It was understood, however, that the arrangement was on similar lines to that arrived at in 1929 between the German, Swiss and French industries in order to develop co-operation in sales and to eliminate destructive commercial competition; in other words, a price cartel. The effect of this arrangement had already been made evident to users in this country, inasmuch as prices of dyestuffs had been substantially increased within the past few months. It was estimated that dyestuffs in this country were now 100 per cent. above pre-war level, an index figure of as against the Board of Trade wholesale commodities figure 200 as against the Board of Trade wholesale commodities figure of 98. The users, throughout their ten years acquiescence in and support of the Dyestuffs Act, had visualised the establishment of a virile British industry, able to face world competition and eventually to supply British users with their full requirements of dyestuffs. When the British industry was fairly well established, that it should enter into an agreement with foreign makers was not quite a fitting reply to all the sacrifices of British users during the past 12 years of prohibition. British users had loyally supported the form of protection afforded under the Dyestuffs Prohibition Act—a method which in practice had demonstrated its efficacy to foster the development of such an important industry as dyestuffs manufacture. The Act, it was felt, was sufficient in itself without the adventitious assistance of international cartels to give the fullest measure of protection to the British industry. Protection did not serve its purpose unless it increased the employment of British labour, and there was a feeling now that with the restrictions of a cartel the financial aspects might be put in the forefront to the detriment of the fullest development and production of dyestuffs to meet the users complete needs.

A Warning against Restrictions

It was to be hoped also that there would be no restrictions arising out of the cartel whereby users would be deprived of their access to the world's markets for dyestuffs possessing properties which were not equalled by our domestic productions. It was often the natural corollary of a cartel that an agreement was made amongst individual members to keep certain products to certain markets, receiving in compensation concessions in other markets. He urged that this should not be applied to products which had outstanding properties not equalled by the products of other members of the cartel. Instances of this had already happened in the British market in certain dyestuffs, and he felt he had only to bring this matter to the attention of the British makers for it to be remedied in any of their future negotiations with the other members of the cartel. Users must have free access to all non-contentious foreign-made dyestuffs.

In addition to the disabilities of a cartel, the revenue duty of 10 per cent. on imported dyestuffs placed a burden on the user for which there did not seem any justification. The dyestuffs imported were such as were not made in this country, and the tariff was simply an addition to the cost of production, which limited the sale of manufactured articles for export. A complete form of protection was afforded by the Prohibition Act, and no additional assistance was being given to British industry by a tariff upon goods not made here. This not only applied to certain dyestuffs, but to many important chemicals which had been included in the general tariff list. These were anomalies which should have the serious attention of the Tariffs Advisory Committee.

Fears in Many Quarters

Fears were expressed in many quarters that the new cartel would limit the development of the British dyemaking industry, inasmuch as there was a tendency for the imports of intermediates to increase as shown by the following figures:—July to December, 1931 (6 months), 87¾ tons; January to May, 1932 (5 months), 241¾ tons. It might be economical to avoid duplication of plant for the British and Continental makers to exchange intermediates, but taking the long view this might place British users in the same awkward position as faced them in 1914 when, on the outbreak of hostilities, they found themselves absolutely cut off from their sources of supply, having been dependent upon foreign makers for 80 per cent. of the dyestuffs required for the textile trade, thus jeopardising upwards of 35 per cent. of the wholly or partly manufactured goods exported. Were the Government's subsidies and the users' sacrifices of the past ten years to be in vain? The establishment of the dyestuffs industry in this country had been achieved only at the expense of many millions of pounds to British colour users who had loyally endeavoured to carry out the spirit of the Government pledge which was entered into during the negotiations prior to the passing of the Dyestuffs (Import Regulation) Act, 1920.

The colour users of Great Britain as represented by the Colour Users' Association had two main grounds for requesting the withdrawal of the 10 per cent. tariff on imported dyewares:—(1) That the Dyestuffs (Import Regulation) Act is in operation, and (2) that an international cartel, including the two leading British makers, has been formed and is now in operation, whereby the British users' privilege of buying at the world's lowest prices is now in jeopardy.

British users of dyestuffs had at the present moment to face (1) the Dyestuffs (Import Regulation) Act, (2) an inter-

national price cartel, (3) a tariff of 10 per cent., (4) heavily increased prices, and (5) depreciated currency. Since the cartel was arranged, notwithstanding many protests at several conferences, prices had been put up by the British makers from 20 per cent. to 40 per cent. just when we were making strenuous efforts to reduce our production costs in order to help to rehabilitate Great Britain's lost export trade. It was the wrong policy to exploit an industry in a time of national emergency; at the present time all energies should be applied towards reducing costs, and he was certain that Parliament never intended that under a Prohibition Act a cartel should be arranged with foreign makers with the object of increasing prices, which would seriously add to—instead of reducing—our costs of production.

He admitted that the makers reduced their prices considerably two years ago, and that they stated they were only putting up these prices to the levels then ruling, but now was not the time to put prices up owing to the hard struggle that the textile trade were having to maintain their business.

Duty on Machinery

The CHAIRMAN moved that the report and accounts of the Association for the year ended April 30 be approved and adopted.

Mr. A. A. CRABTREE (Manchester) seconded.

Mr. T. PARKER SMITH (Birmingham) raised a point with regard to the 10 per cent. tariff on dyewares. He stated that he had recently visited Germany in connection with some machinery which was not made in this country. He was given certain quotations for certain machines. About three weeks afterwards he received a letter from nearly all the manufacturers to the effect that the duty was now remitted upon such machinery because it had been agreed that it was not made in England. This appeared to be a position which was entirely on all fours with that so excellently elaborated in the chairman's address. The dyewares were not manufactured in this country and yet they were very necessary for industrial purposes.

Mr. FORREST HEWIT said that, as Mr. Parker Smith had raised the question, he thought it was only fair to say that the council as a whole did not share his opinion regarding the discrimination between chemicals made in this country and those which were made abroad.

The CHAIRMAN stated that the reason he referred to dyewares made abroad and the 10 per cent. duty was because there were some few dyewares coming into this country.

The motion was carried unanimously.

The New Council

The following list contains the names of those appointed to serve on the council of the association:

Elected by amalgamated companies.—Bleachers' Association, E. Carr Deakin; Bradford Dyers' Association, Sir Henry Sutcliffe Smith, James Ewing and Thorp Whitaker; British Cotton and Wool Dyers' Association, C. Rawson, P. Caldwell and E. T. Holdsworth; Calico Printers' Association, C. C. Railton, Forrest Hewit and W. E. Kay; J. and P. Coats, Ltd., T. W. Hirst; English Sewing Cotton Co., Ltd., Peter Ermen; English Velvet and Cord Dyers' Association, A. A. Crabtree and G. E. Holden; Leeds and District Worsted Dyers' and Finishers' Association, C. W. Wade; Smith, Stone and Knight, Ltd., T. Parker Smith; F. Steiner and Co., Ltd., T. R. Fothergill; United Turkey Red Co., Ltd., John F. Christie; Wallpaper Manufacturers, Ltd., Osmund Smith; Yorkshire Indigo, Scarlet and Colour Dyers, Ltd., George Hodgson.

Elected by trade groups:—Calico printing—A. Davidson, W. L. Dixon and E. Drew; wool dyeing—Henry Blackburn, George Garnett, H. Jennings and C. M. Whittaker; cotton dyeing—W. W. L. Lishman, G. H. Oldham, and W. Watson; silk dyeing—James Dishley; garment dyeing—H. L. Mitchell; paints and pigments—Thomas Taylor; miscellaneous—J. R. Denison.

Mr. FORREST HEWIT moved a vote of thanks to the chairman for presiding.

The CHAIRMAN, in briefly responding, said that although he had specifically referred to dyewares not made in this country, in order to emphasise the argument it would naturally refer to all dyewares coming into the country.

Cellulose Acetate Silk Co.

Progress of the Past Year

THE profit and loss account of the Cellulose Acetate Silk Co., covering the year to the end of last March, showed a gross profit of £104,890, compared with losses of varying amounts in the three previous years of the company's existence. That was an improvement deserving warm praise in such a year as 1931-32, which, though since last autumn it had seen record monthly production and consumption of rayon yarn, was still seriously affected by price-cutting, especially in acetate. According to "The Financial News" there is, however, one point which calls for criticism. The accounts included in the gross profit an unstated amount received on the cancellation of a contract. It seems unlikely that that compensation payment should have accounted for much of the £104,890 gross profit, or even of the £50,015 net profit, but to leave no doubts in the shareholders' minds, the precise sum received should have been set out in the accounts. This, however, was not done, and the chairman's failure to repair the omission in his speech at the fourth annual general meeting at Lancaster on July 26 must necessarily detract somewhat from the value of what was otherwise a candid and encouraging statement of the company's position.

Reduction in Cost of Production

Steady progress has been made in methods of manufacture, and that as a result of the increased efficiency which has been attained, the acetate plant is now capable of producing 100 per cent. more acetate than was originally anticipated, and the spinning plant of turning out at least 33 per cent. more than the estimate for which it was designed. The result has been a consistent reduction in the cost of production, the benefit of which has not yet been fully felt. Considerable sums have been expended on research work, and the company has obtained very valuable results from it.

On the subject of patents the chairman mentioned that in some quarters it appears to be the practice to obtain patent rights for any small experiment, or even variation in the methods of manufacture. The policy of this company, however, is only to make patent applications for important improvements or for entirely new processes. Certain inventions have not been patented at all, but are being worked as secret processes.

Sicilian Sulphur Industry

Consortium to Wind-Up

THE control exercised by Fascism over industry is illustrated by the announcement of the winding-up of the Sicilian Sulphur Industries Consortium.

The consortium, membership of which was obligatory for all firms engaged in the industry in the island, endeavoured, in co-operation with American sulphur producers, to check the disastrous fall in prices caused in all industries by the world depression. This policy had a measure of success, but it could not check the fall in consumption, and gradually enormous stocks of sulphur, totalling about 200,000 tons, accumulated unsold in the consortium's warehouses. The consortium then asked the Government either to enlarge its scope so as to cover the whole of Italy, or else to dissolve it and allow component firms to resume free competition. The Government decided on the second course.

Disposal of Accumulated Stocks

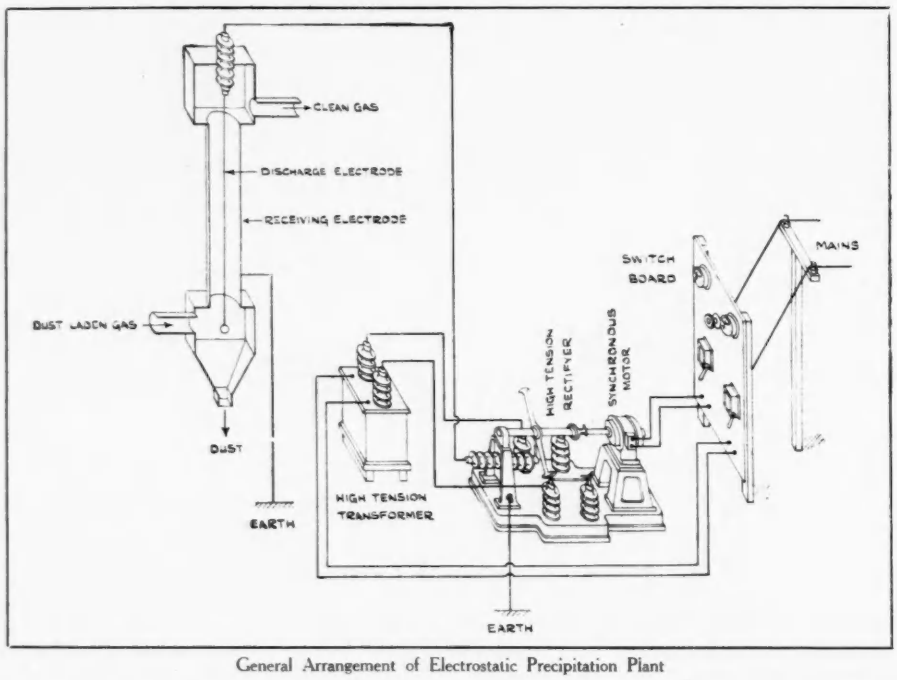
The consortium will therefore go into liquidation at the end of this month, and the stocks of sulphur in hand will be sold. In order to avoid the flooding of the market, however, the Government has decided that the sale shall be extended over a period of six years. The creditors will receive immediately the price of 300 lire (£4) per ton from two Sicilian banks, the Bank of Sicily and the Cassa Centrale di Risparmio of Palermo, which will undertake to place certain quantities of sulphur on the market from time to time when conditions are favourable. To make good any loss which the banks may suffer by the transaction, the Government will allocate in the Budget of the Ministry of Corporations a sum of 4,000,000 lire (about £57,000) a year for six years.

Electrostatic Precipitation

Its Application in the Removal of Dust and Mist from Gases

This article is based on information supplied by the Sturtevant Engineering Co., Ltd., of London, who are now associated with the Société de Purification Industrielle des Gaz, of Paris, in the design and construction of plant for the cleansing of gases by methods of electrostatic precipitation.

THE idea of removing very fine particles from gases by electrostatic means originated as early as 1819, when C. S. Rafinesque, of Paris, described the origin and character of atmospheric dust and mentioned that an electrified stick of sealing wax would, even at a considerable distance attract this dust. He also noticed that dust is the most sensitive indicator of the presence of an electric charge. Five years later, Hohlfield, of Leipzig, called attention to the possibility of precipitating smoke by means of an electric charge. He carried out some experiments by filling a flask with smoke, and then inserting into the flask a pointed wire which was connected to a source of electric supply. As soon as the wire was charged the smoke in the flask was precipitated. It was also noticed by G. F. Guitard in 1850, that if an electrically charged wire was inserted into a smoke-filled cylinder the smoke would immediately fly to the sides of the cylinder. This led later investigators to make quantitative measurements of the electrical discharge from smooth thin wires suspended in tubes, and in 1866, Gaugain noticed that dust from the atmosphere was collected on the tube walls.



General Arrangement of Electrostatic Precipitation Plant

Fundamental Principles

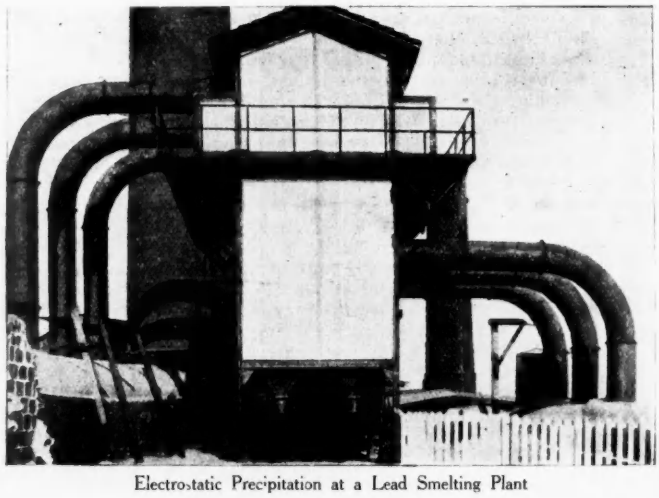
Numerous other investigators took up the work about this time, but for some years very little progress was made towards applying the idea to commercial uses, this being mainly due to the difficulty of providing suitable high-tension machines and insulators. Despite these difficulties, however, some large scale experiments were carried out in Great Britain and in Germany, and interesting results were obtained, but it was not until the early years of the present century that electrical technique advanced to such a point that a reliable supply of direct current at 40,000 to 50,000 volts could be supplied. After this, the future of electrostatic precipitation was assured, and it was not long before plants were installed in numerous industries, especially in connection with acid works, cement works, and metallurgical plants.

Electrostatic precipitation provides a method of cleaning industrial gases to a degree of fineness which is very difficult to obtain by any other methods, such as filters, scrubbers, etc. It is also a means of obtaining the material in its original state, and not in the form of a sludge as is usual in gas scrubbers. This fact, especially when the material is of some value, represents a distinct saving in the total cost of recovery.

The precipitation is brought about by passing the dust laden gas through a number of tubes arranged in parallel, which vary in diameter from 6 in. to 10 in., depending upon the nature of the gas to be treated, and in length from 10 ft. to 14 ft. Down the centre of each tube is suspended an electrode, made, in some cases, of a single thin wire, or in others, of rods of various sections. These wires or rods are connected to a high-tension electrical source of supply which produces direct current at pressures varying from 30,000 to 80,000 volts. The tubes and casing of the precipitator are earthed so that there is a high potential difference between the rod, which is termed the discharge electrode, and the tube or receiving electrode. As soon as the dirty gas enters the tube, each particle is subjected to an electrical force caused by the field set up inside the tube by the difference of potential between the discharge and receiving electrodes. This electrical force which is caused by the ionisation of the zone surrounding the discharge electrode drives the particles away from the rod and towards the tube, each particle assuming a course which is the resultant of the force imparted by the velocity of the gas and the force created by the electrical field.

Factors affecting Design of Plant

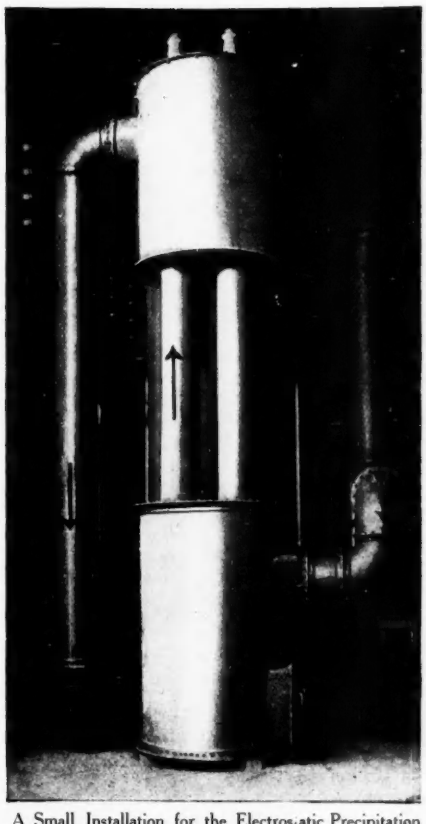
The particles, having arrived at the tube walls, adhere to these walls and are removed in the majority of cases, by rapping. Some particles will fall of their own weight, when a layer of sufficient thickness has been built up, but it is usual and safer to supply a rapping device and not trust to the characteristics of the material. The material removed from the tube walls by the rappers falls into hoppers at the bottom of the precipitators, where it is removed by some suitable means such as a screw conveyor. In the case of liquids, these



Electrostatic Precipitation at a Lead Smelting Plant

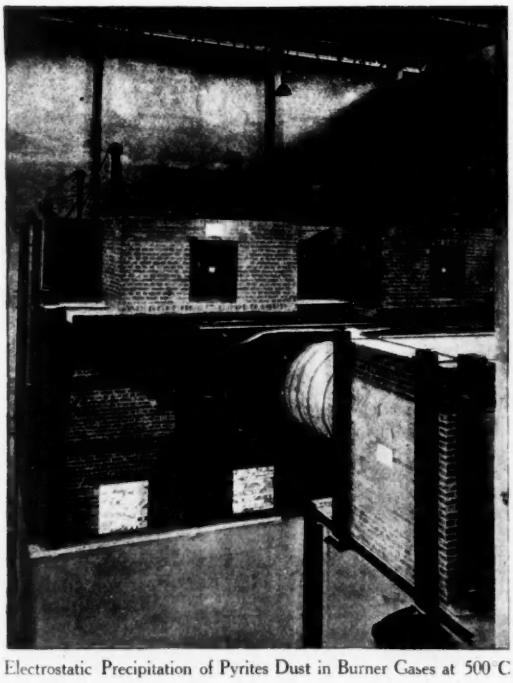
trickle down the side of the tubes and no rapping device is necessary. It should also be noted that there is little danger of small precipitated particles being caught by the ascending gas stream when falling at the inner face of the tubes owing to the very low velocity of the gas at the tube surface.

From the arrangement of the precipitator shown in one of the accompanying illustrations the general principle of electrostatic precipitation of dust appears fairly simple, but the various factors which must be taken into consideration when designing a plant are of considerable importance. The character of the particles, that is, whether they are cement, pyrites, acid mist, grits from powdered fuel installations, etc., and the approximate diameter of the particles must be considered. For instance, with large dust particles, say of 50 μ to 100 μ in diameter (1 mm. = 1,000 μ) a certain size precipitator giving a definite gas speed would be required. If the particles are of smaller size, say between 1 μ and 0.1 μ a larger plant would be necessary, for the smaller the particle the more difficult becomes the problem of its removal from the carrying gas. The precipitation of these small particles, however, is by no means impossible, nor even unduly costly, for particles below 0.1 μ in diameter, *i.e.*, those particles which exhibit under the microscope distinct Brownian movements, are successfully removed from gases. The temperature of the gases is also an important factor which, to a great extent, determines the tube diameter and voltage required, and occasionally determines the type of precipitator to be used. Frequently, it is desired to dissipate the heat in the gases, and in such plants one type of apparatus would be used, while in other circumstances where it is advantageous to maintain the gas temperature as high as possible, a different type of precipitator would be recommended.

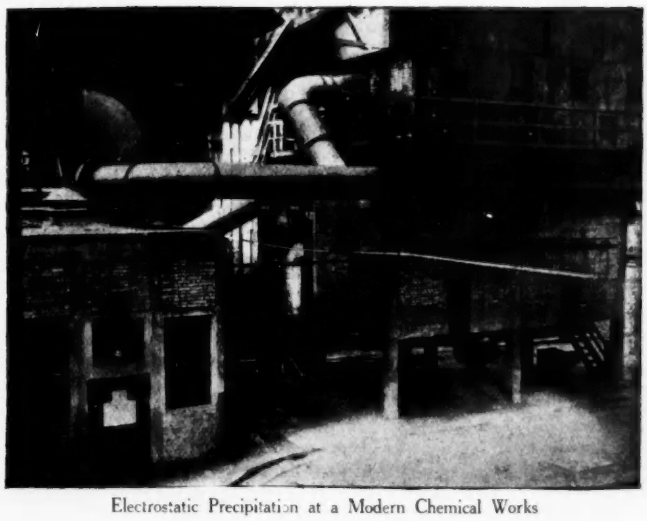


A Small Installation for the Electrostatic Precipitation of Copper Oxide

Large variations in results are obtained by using various types of discharge electrodes, and although very high com-



Electrostatic Precipitation of Pyrites Dust in Burner Gases at 500° C



Electrostatic Precipitation at a Modern Chemical Works

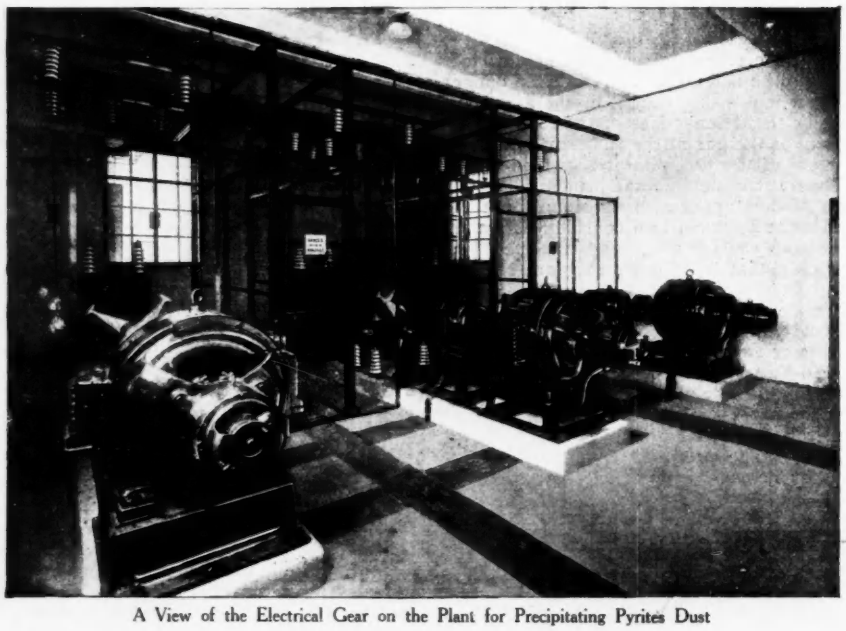
mercial efficiencies are common, continual research is being made into the most efficient size and shape of rod or wire for particular problems. Generally, it is desirable to operate a precipitator, if possible, under a suction no matter how slight, rather than a pressure, as a more suitable and simple arrangement of insulators is obtainable under suction conditions. However, pressures present no great difficulties, and in cases where the existing plant prohibits the installation of a precipitator on the suction side of the fan or chimney, a satisfactory construction can be used which will ensure constant and efficient working.

High-Tension Equipment

When precipitating dust by means of the electrostatic principle the best results are obtained by the use of unidirectional current of negative sign. This current is provided by a relatively simple apparatus usually consisting of a low-tension auto-transformer, an oil-immersed step-up transformer for the high-tension and a high-tension rectifier. The auto-transformer is of the ordinary type and is merely used to vary, to some small degree, the input voltage of the step-up transformer. This piece of apparatus, which produces the high-tension alternating current is not, to any degree, out of the ordinary except for its resistance to the high-frequency waves due to the sparks produced by the rectifier

The rectifiers are generally mounted on the shaft extension to a four-pole synchronous motor. On this shaft are keyed two metallic arms, or steel pointers arranged at 90° to each other. One of these arms is mounted on an insulating sleeve fitted with a slipring. The insulated brush forming the negative high-tension pole is in contact with the slipring. The other arm is mounted direct on the shaft, and brushes connected to earth are in contact with this shaft; this forms the positive pole of the machine. Opposite to the arms are two pairs of insulated sectors fixed at 90° and connected to the high-tension terminals of the step-up transformer. The gap separating the sectors from the ends of the rotating arms is about one to two millimetres. This gap is easily jumped by small sparks when the rectifier is in operation, the principle of which is easily understood. A quarter of a revolution of the rectifier corresponds to a period, so that with every change in the direction of the current, each arm collects the current of suitable polarity from the corresponding sector. The stator of the synchronous motor driving the rectifier is also fixed in a cradle which allows a certain amount of angular adjustment in relation to the remainder of the set, so that the rectifier can be easily synchronised with the available current supply.

Electrostatic rpecipitation is now used in cement works and lime kilns for the collection of dust from flue gases, furnaces, dryers, ball and tube mills; in drying, grinding and calcining for the recovery of coal dust, potassium chloride, talc, phosphate, iron and alumina; in metallurgical operations for the recovery of the oxides of antimony, copper, tin, lead and zinc, and for metallic tin, lead and zinc fumes; in sulphuric acid works for the cleaning of gases from pyrites or blende roasting furnaces, the elimination of arsenic from the gas, and precipitation of acid mist; in chemical industry for the precipitation of various acids, and the cleaning of gases; in blast furnaces for the cleaning of gases intended for heating Cowper stoves, and for gas engines; in the carbon industry for the collection of lamp black; in the gas industry for tar precipitation; and generally in other industries where gases are blown into the atmosphere carrying valuable dust and mist or where they are liable to create a nuisance. Such plants will recover dust particles of microscopic size in a dry state as opposed to othe form of sludge which is a troublesome by-product. The amount of current consumed is extremely small, maintenance charges are low, and the loss of head through this precipitator is negligible. In many cases, too, the value of the material collected shows an excellent return on the capital cost involved.



A View of the Electrical Gear on the Plant for Precipitating Pyrites Dust

Sulphuric Acid Manufacture

Trend of Recent Developments

THE large number of patents covering the production of sulphur from pyrites bears witness to the persistent attempts towards a satisfactory solution of this particular problem of the sulphur acid industry. The two main lines of attack have been through intermediate formation of H_2S or SO_2. From a review of the industry by Dr. Bruno Waeser in "Metallborse," July 20, it appears that complete success has attended the starting-up of a plant at the Orkla works in Norway, which produces sulphur by reduction of sulphur dioxide. Regarding the alternative method involving oxidation of sulphuretted hydrogen, recent investigations in the United States and Germany have revealed the value of methane as a reducing agent for iron pyrites, either alone or in admixture with the air. Judging by the statistics of the chief producing countries, the chamber process is undergoing steady displacement by the contact process, particularly in conjunction with vanadium catalysts. The share of contact methods in the total output has risen from 20.4 per cent. in 1913 to 28 per cent. in 1931.

Fuel Economy in Industry

A Résumé of Present-Day Problems and Modern Methods

THE 1932 issue of "Fuel Economy Review," which is published by The Federation of British Industries (price 2s. 6d. net), contain articles on many aspects of industrial fuel and power practice by expert authorities, including not only surveys of progress in relation to the preparation and treatment of coal but also authoritative articles on a number of practical aspects, including gas producers, metallurgical furnaces, mechanical stokers, waste heat boilers, smoke indicators and air pre-heaters.

The extensive losses which result from the use of low power factor apparatus are dealt with by Mr. D. B. Hoseason in his article on " Power Factor and Coal." These losses are quantified in respect of motors, distributors, transformers, transmission lines and generators and will therefore be of considerable interest to power provision engineers. The principal methods by which low power factor may be corrected, the types of plant available for this purpose, their advantages and limitations and the savings which can be effected in the power bill by taking advantage of a power factor tariff, are the chief points discussed.

The mechanical and thermal aspects of the furnace wall is the subject of valuable contribution by Sir Robert Hadfield and Mr. R. J. Sarjant. This article includes charts constructed by the authors for the ready determination of the flow of heat through a composite wall of standard fire brick and diatomaceous insulating brick and proceeds to deal with the flow of heat through a furnace wall under fluctuating conditions, observations having been made on various types of furnaces under industrial conditions with the object of relating the character of the flow of heat to the materials and dimensions of the walls studied and the temperatures and rate of heat attained in the furnace chamber.

Air Preheaters and Cheap Steam

Mr. W. Newton Booth, assistant mechanical engineer of Woolwich Arsenal, contributes an article on the application of air preheaters to industrial steam raising plants, based on his experience at the Arsenal. Data is given in this article relating to the operation of plant with and without air preheaters, while the section on the economics of air preheating gives approximate costs of installing air preheating in connection with typical Lancashire boiler and water tube boiler plants and actual operating costs per thousand pounds of steam evaporated, which figures clearly indicate the savings which can be effected by the application of this type of plant.

Aspects of the chemistry of boiler water is the subject of a contribution by Mr. H. E. Jones, of Imperial Chemical Industries, Ltd. This article deals with scale formation, the prevention of scale, water treatment, water conditioning for high pressure boilers and caustic embrittlement. Sir Frederick Nathan, another contributor, gives a valuable résumé of information on the storage of coal. Here the factors affecting oxidation and heating of stored coal are dealt with in detail and the conditions under which coal can be stored in practice so as to eliminate or to materially reduce the effect of these factors is discussed.

Waste Heat Boilers

In his article on " Economic Factors affecting Waste Heat Boiler Practice," Mr. G. E. Hider has extended the information given in his paper " A Rational Basis for the Design of Fire Tube Waste Heat Boilers," which was read before the Institution of Mechanical Engineers, indicating the importance of certain factors which are not apparent during a preliminary survey of the plant concerned and the operating conditions. The subject is dealt with under the headings of the evaluation of the quantity and availability of the heat contained in the flue gas; general principles incorporated in waste heat boiler design, and conditions which determine economic efficiency.

This issue of " Fuel Economy Review " also contains two valuable and informative articles on aspects of atmospheric pollution, one by Mr. J. E. Braham, of Imperial Chemical Industries, Ltd., on " Dust Removal Apparatus for Boiler Plant," and one by Mr. J. Fraser Shaw and Mr. T. F. Hurley, of the Fuel Research Station, on Smoke Indicators for Commercial Use." Mr. Braham classifies the many types of industrial dusts and proceeds to examine the various of apparatus available for gas cleaning finally dealing with experimental work on the cleaning of gas from pulverised fuel boilers. The article on smoke indicators deals briefly with the principles and application of smoke recorders and indicates that the use of a smoke recorder can be justified both as an aid to the maintenance of efficient combustion and as a means of preventing smoke from a given chimney exceeding an objectionable limit. This type of instrument should, in the opinion of the authors, prove a useful and trustworthy addition to the boiler house control panel.,

Other articles include " Some Programmes at the Fuel Research Station " (F. S. Sinnatt); " The Cleaning of Coal " (R. A. Mott); " Low Temperature Carbonisation " (C. H. Lander); " Review of Gas Works Practice, 1931 "• (H. D. Greenwood); " Technical Developments in the By-product Coking Industry during 1931 " (G. E. Foxwell); " Area Gas Supply " (E. W. Smith); " The Technique of Power Gas Producer Operation " (H. L. Pirie); " Heat Balances of Industrial Furnaces and their Practical Application " (W. A. Moorshead; " Mechanical Stokers for Metallurgical Furnaces " (H. Clifford Armstrong); " Some Fundamentals of Open Hearth Design " (V. H. Legg); " The Slag Problem in Iron Foundry Practice " (J. E. Fletcher); " The Application of Pulverised Coal Firing to an Industrial Boiler Plant " (W. J. Drummond); " Control of a Small Scale Industrial Steam Plant " (D. A. Hackett); Fuel Economy in Domestic Heating " (A. H. Barker); " Furnaces for the Heat Treatment of Wire " (R. Whitfield); and " The Tendency to Increased Fuel Economy in the Ceramic Industries " (Stanley R. Hind).

Iodine Monobromide

A New Method of Preparation

A NEW method of preparation of iodine monobromide is described by J. Cornog and R. A. Karges in the " Journal of the American Chemical Society," 1932, *54*, 1882. Liquid chlorine is introduced into a tared flask which is cooled with solid carbon dioxide and ether. A mass of solid iodine approximately one-half the molar equivalent of the mass of chlorine is added; the contents of the flask become solid. The flask and its contents are permitted to warm gradually to room temperature. Uncombined chlorine evaporates during this process. The flask and its contents are weighed. Knowing the weight of the iodine previously added, it is now possible to calculate and add a mass of iodine just sufficient to convert the crude product into the monochloride, which is then purified by recrystallisation. Iodine monochloride is a polar or associated liquid which freezes at 27.19° C.

Vacuum Distillation

Measurement of Saturation Vapour Pressure

IN a recent paper on vacuum technique (" J. Franklin Inst.," February, 1932), Dr. K. Hickman, of the Kodak Research Laboratories, has directed attention to the serious errors which may occur in the measurement of the saturation vapour pressure of liquids when that pressure is of the order of a millimetre of mercury. Unless the vapour pressure is measured close to the thermometer which gives the temperature, the correction for the drop of pressure from thermometer to manometer becomes of the order of the pressure to be measured. Dr. Hickman enlarges the head of the rectifying column, places the thermometer in the enlargement, and either measures the pressure there directly or by the aid of a column of the condensed liquid in a U-tube between the enlargement and the manometer. With this arrangement, he finds that the relation between log (pressure) and the reciprocal of the absolute temperature continues to be linear down to very low pressures.

Leather Darkening

Decreasing the Effect of Exposure to Light

THE darkening of certain leathers on exposure to light is a defect well-known in the leather trade. It is particularly undesirable in the case of leathers which have been dyed a delicate shade. Conditions associated with this defect have been investigated by Lamb and Gilman ("J. Soc. Leather Trades Chem.," 1932, p. 355). The catechol tans are more prone to darkening than those of the pyrogallol class, while the presence of acid accentuates the trouble. This was demonstrated by treating pieces of East Indian sheep leather with solutions of pH 1.8 to 9.0, subsequently drying and exposing to the mercury vapour lamp. The extent to which darkening took place decreased as the alkaline side was approached. Where undyed leathers are required, as for shoe linings, it is important that a final acid condition be avoided, and the leather brought as near to neutrality as possible. It is usual to strip many leathers with a solution of borax or some other alkali to remove the excess tannin, "clear" with sulphuric acid and then re-tan, and it is now suggested that, where possible, the "clearing" with acid be omitted. Where it is absolutely necessary, as with iron stained goods, an after-treatment with a sodium acetate solution is recommended prior to re-tanning.

Fine Chemicals

New Products of The British Drug Houses

THE July edition of the catalogue of fine chemical products manufactured by The British Drug Houses, Ltd., comprises over 4,000 laboratory chemicals. Specifications for a number of these chemicals will be found in "The B.D.H. Book of A.R. Standards." Analytical data relating to other items will be supplied to purchasers on request. By means of the control which is exercised through their staff of chemists, this firm seeks persistently not only to maintain but to enhance the very high standard of purity and the reputation for reliability for which the B.D.H. pure chemicals for scientific purposes are now well-known. As a further measure of security for the reliability of every package sent out, every item is offered in containers of standard sizes, for it has been recognised that in order to secure ideal conditions for the packing and storage of pure chemicals, it is greatly to be preferred that they should be bottled or put into sealed tubes immediately after manufacture, and that they should be supplied in these containers to users. Included among new manufactures are the following:—Acetaldoxime, acetyldiphenylamine, aluminium selenide, aluminium telluride, *a*-aminabutyric acid, *p*-amino triphenylamine hydrochloride, anisyl alcohol, benzhydrol, boron nitride, bromanil, *β*-bromophenylpropionic acid, chitin, *o*-chloro-anisole, *p*-chloro-anisole, cholesteryl oleate, *o*-cresyl carbonate, *p*-cresyl carbonate, dehydrocholic acid, dibromo-dimethyl-fluorescein, diethylamino-ethanol, diethyl-*o*-toluidine, dihydroxy-dihydrindamine, dihydroxy-tartaric acid osazone (sodium salt), 2 : 6-di-iodo-4-nitraniline, di-*a*-naphthyl urea, diphenylamine sulphonic acid (oxidation-reduction indicator), *N*-*N*^{1}-diphenyl-*m*-phenylenediamine, *N*-*N*-diphenyl-*p*-phenylenediamine, ethyl phenyl-cyanacetate, *d*-glucosamine hydrochloride, guanine, *n*-heptyl bromide, *n*-hexyl bromide, histamine hydrochloride, laevulose (dextrose free), lanthanum oxide, mercury ammonium thiocyanate, mercury potassium thiocyanate, *a*-methyl-*n*-butyl bromide, methyl phthalate, molybdenum blue reagent (Zinzadé), *β*-naphthoquinoline, 2-naphthylamine-5-sulphonic acid, 2-naphthylamine-8-sulphonic acid, nitramine (indicator), *o*-nitro-benzyl iodide, *p*-nitro-benzyl iodide, *o*-nitro-*m*-cresol 1 : 3 : 2 3-nitrophthalic acid, *w*-nitrostyrene, n-octyl bromide, *o*-phenyl-phenol, potassium *iso*-butyrate, potassium malonate, potassium metaborate, rhodamine B (for antimony test), sarcosine, sodium *iso*-butyrate, sodium caprylate, sodium dehydrocholate, sodium laurate, sodium meconate, sodium phenyl-cinchoninate, sodium phosphate (sorensen's salt), sodium pyruvate, stearyl chloride, *m*-sulphobenzoic acid, *ac*-tetra-hydro-*β*-naphthol, thallium sulphide (ous), thorium carbonate, thorium fluoride, *o*-toluene-sulphonic acid, tolylene blue (oxidation-reduction indicator), *p*-tolylenediamine, tripalmitin, tristearin, uranium iodide, vitamin A oil, Xylene sulphonamide and Xylene sulphochloride.

Utilisation of Indian Bamboo

Cellulose for Artificial Silk

THE Forest Research Institute at Dehra Dun, India, has been busy for some time past in carrying out experiments to prepare cellulose from *Ochlandra Travancorica* (bamboo) conforming to the specifications demanded by the artificial silk industry, and it is now reported that a partial measure of success has been attained. The maximum percentage of *α* cellulose which is the most important constituent for art silk, and which has been attained in bamboo pulp is 89-90 as against 95-96 in the *α*-wood pulp now on the European market. Further, the percentage of ash in bamboo pulp has been rather high, about 0.3 per cent., the maximum required for cellulose for art silk being 0.1 to 0.2 per cent. It is proposed to continue the experiments on this problem, and a successful solution may help the establishment of a new important and promising industry in the country. During the past year, a few preliminary experiments indicated that a complete and uniform disintegration of the raw materials in the manufacture of bamboo pulp would considerably help in lowering the consumption of chemicals and steam required for the chemical progress of digestion. It was found that a satisfactory disintegration of the raw material could not be obtained with the existing crusher and chipper, and so arrangements were made for the disintegration of about one ton of bamboo in a special disintegrator installed in the workshops of the Imperial Public Works Department at Delhi. The digestion of the disintegrated material gave promising results and a systematic investigation is now in progress at the Institute itself.

Licensing of Machinery

Exemptions from Import Duties

THE Import Duties Advisory Committee is open to receive applications in connection with the scheme authorised by Section 10 of the Finance Act, 1932, for the exemption of particular consignments of machinery, being machinery of a kind not for the time being procurable in the United Kingdom, from the whole or part of the duties chargeable under the Import Duties Act, 1932. Section 10 provides that if the committee is of opinion that, having regard to all the circumstances, it is expedient that such machinery should be allowed to be imported without payment of all or any of the duties chargeable under the Import Duties Act, 1932, it may make a recommendation to the Treasury accordingly, and the Treasury, after consultation with the Board of Trade, may by licence authorise the importation of the consignment in accordance with the recommendation.

The Committee may at any time recommend that this section shall apply to any class or description of machinery, or shall cease to apply to any class or description of machinery to which it previously applied, and where any such recommendation is approved by the Treasury, the section shall apply or cease to apply accordingly. The committee has recommended and the Treasury have approved that the section shall at present apply to the following classes or descriptions of machinery:—Machine tools, including metal working and woodworking machinery; agricultural, including dairy machinery; sugar making, textile, glass making and working, chemical and soap making, weighing, packing and filling, paper making, printing, bookbinding and labelling machinery; machinery for corrugating, cutting, creasing and folding paper and cardboard and for the manufacture of cardboard boxes, tubes and cartons and of paper bags; metal and leather printing and embossing machinery; electric furnaces, cable making, tobacco, cigar and cigarette making, food preparation, brush making, fur skin dressing, preparing and finishing machinery.

Application may be made by or on behalf of a firm purchasing machinery for their own use, or by an importer having the sole agency for the sale of a particular machine in this country. The appropriate forms of application may be obtained on request in writing from the Secretary, Import Duties Advisory Committee, Caxton House, (West Block), Tothill Street, Westminster, London, S.W.1. Firms who have already been in communication with the Committee on this subject will receive the appropriate forms without further application.

Chemical Trade Conditions in India

A Survey of the Past Fiscal Year

PARTICULARS of chemical trade conditions are included in a survey of the import trade of India, for the fiscal year ended March 31, 1932, prepared by the British Trade Commissioner in Calcutta, which has lately been issued by the Department of Overseas Trade (Ref. No. C.3904).

During the twelve months ended March, 1932, the value of the imports decreased, as compared with the corresponding period of 1931, by £28,500,000 or 23 per cent. and amounted to £94,500,000 and the total exports, including re-exports, fell by £48,750,000 or 29 per cent to £120,750,000. The exports of Indian merchandise showed a decrease of £48,750,000 or 29 per cent., and re-exports also decreased by £367,500 or 9 per cent. The grand total of imports, exports and re-exports amounted to £215,250,000, as against £292,500,000, a decrease of £77,250,000 or 26 per cent.

Paints, Colours and Soaps

There was a further fall in the total trade from £643,125 to £498,750, the United Kingdom share being reduced from £405,000 to £322,500. The imports from Germany fell from £76,875 to £58,125, while those from the United States were reduced from £35,625 to £22,500. The imports from Japan remained constant at £30,000, while those from "other countries" fell from £93,750 to £67,500.

The total imports, which in 1929-30 amounted to 447,939 cwt. fell in 1931-31 to 332,322 cwt., and to 309,784 cwt. in 1931-32. The United Kingdom share which in 1930-31 was 295,485 cwt. had declined to 264,763 cwt. in 1931-32. The imports of household and laundry soap amounted to 265,655 cwt., toilet soap 31,776 cwt. and other sorts 12,353 cwt.

There was a slight drop in the quantity of dyes imported from 3,241,287 lb. to 3,211,913 lb., but the value increased from £121,875 to £136,875. The imports from the United Kingdom rose from 723,741 lb., valued at £28,125, to 858,055 lb., valued at £41,250. The imports from Germany in 1930-31 totalled 2,369,593 lb., valued at £88,125, and in 1931-1932 they totalled 2,353,708 lb., valued at £95,625.

The total imports of aniline rose from 12,818,809 lb., valued at £1,357,500, to 13,035,228 lb., valued at 1,405,625. It is satisfactory to record that the imports from the United Kingdom increased from 821,045 lb., valued at £86,250, to 1,314,932 lb., valued at £116,250. There was also a slight increase in the imports from Germany from 9,494,354 lb., valued at £948,120, to 9,590,490 lb., valued at £1,027,500. There were reductions in the imports from the United States from 1,155,913 lb. (£97,500) to 982,288 lb. (£82,500), and from Italy from 685,665 lb. (£58,125) to 322,615 lb. (£37,500). Imports from Switzerland increased from 486,895 lb., valued at £121,875, to 503,082 lb., valued at 105,000.

Heavy Chemical Products

There is only a slight decrease from £1,959,375 to £1,927,500 to record under the heading of chemicals. Details of the countries of origin are not yet available, but the following table gives the imports under the main heads:—

	1930-31. £	1931-32. £
Acids	75,000	63,750
Bleaching powder	67,500	73,125
Carbide of calcium	63,750	50,250
Disinfectants	60,375	52,500
Potassium chlorate	48,750	58,125
Sodium bicarbonate	52,500	60,000
Caustic soda	204,375	230,250
Sodium carbonate	483,750	403,125
,, cyanide	26,250	26,250
,, silicate	26,250	16,875
Sulphur (brimstone)	136,875	120,000

The imports of drugs and medicines only show a slight decrease from £1,455,000 to £1,432,500, but details of the countries of origin are not available. The principal items included under this heading are as follows:—

	1930-31. £	1931-32. £
Camphor	202,500	217,500
Proprietary and patent medicines	322,500	345,000
Quinine salts	173,500	191,250
Saccharine	7,500	15,000

Wood Saccharification

Technique of the Scholler-Tornesch Process

THE economic utilisation of wood waste, of which large quantities are available has been an urgent problem for many years. Of the two constituents of wood, cellolose and lignin, which together form about 80 per cent. of the total dry substance, only the former has so far found any rational application. By hydrolysis, cellulose is converted into glucose, which can be used as a foodstuff and for the production of alcohol. The saccharification of cellulose by means of concentrated hydrochloric acid (the Willstatter and Zechmeister method) has been studied by Bergius. Another method is that of Scholler, who uses dilute sulphuric acid (0.2-0.8 per cent.) at high temperatures, *i.e.*, 160-190° C., under pressure. (Schaal, "Chem. Zeit.," 1932, p. 228.) The difficulty with the use of strong hydrochloric acid is to obtain a plant which will be sufficiently resistant to the acid. The Scholler method described by Dr. B. Rassow ("Chem. Zeit.," 1932, p. 330) is simpler from the point of view of the plant required. Many years of experience with the bi-sulphite boiling process has shown that the plant used successfully resists the dilute sulphuric acid present in the process.

Although it has long been known that cellulose is converted quantitatively into glucose by hydrolysis, the difficulty has been that the glucose, under the influence of the hot acid, is liable to further decomposition. In the Scholler process, the sugar is removed from this influence as quickly as possible. This is effected by allowing the acid liquid to percolate through the woody material at a pre-determined speed, with *pH*, temperature and pressure carefully controlled. In this way, the glucose formed is removed from the further effects of the hydrolysing acid, and the yield consequently high. All the reducible material present is not glucose; there are also reversion products such as pentoses from the xylans, etc., but about 80 per cent. of the reducing sugars are fermentable. The percolators used are of cylindrical form, 10 m. high and 1.6-1.8 m. internal diameter, provided with cone arrangements at top and base, with manholes for charging and discharging. These percolators are lead-lined and have a capacity of about 20 cub.m. The lower cones are provided with acid-resisting filters to retain lignin particles whilst allowing the sugar solution to pass through. The percolating dilute acid is pre-heated before entering the vessel, which latter is worked at a pressure of 10 atm. In practice the percolator is charged with 6,300 kg. of air dry red pine wood shavings (5,600 kg. dry matter), and the temperature is raised to 175° C., when 0.5 per cent. sulphuric acid is allowed to flow through the wood at a pressure of 7-10 atm. The acid sugar solution then passes through a neutraliser filled with crude phosphate and limetone. When cool enough, the pressure is released and the liquor is allowed to clarify by sedimentation. About 85 cub.m. of liquor is thereby obtained, containing reducing sugars which represent 43.34 per cent. of the weight of the dry wood substance. Of these, 80 per cent. are fermentable giving 22 litres of spirit per 100 kilos dry wood. Other large scale tests have given yields of 38 to 40 per cent. fermentable sugars or 240 litres spirit per 1 ton of dry wood. The liquor is fermented after having been adjusted to the reaction best suited to the yeast used, nutrient salts also being added. The lignin, which at the end of the saccharification process fills 25 per cent. of the total capacity of the percolator is removed by a screw-like arrangement, and is used for fuel.

Mechanical Digging for Kauri Gum

A New Zealand Experiment

WITH a view to establishing mass production of kauri gum in New Zealand, a mechanical digging experiment is being made at Tomarata, near Wellsford, on a virgin area of 650 acres of gum-bearing swamp land. Two light motor-driven shovels are in use. It is claimed that each shovel employs a crew of about ten men, most of them being engaged in extracting the gum from the strata laid bare by the shovels, and that ten men working with a power shovel are doing the work of sixty. The gum in the fields thus exploited appears to be found in deposits varying from eight to twelve feet below the surface. In connection with the mechanical digging at Tomarata, a rotary power-driven cleaning plant has been installed, having a capacity of three and a half tons of gum per eight hours. The success said to be attending the small scale power shovel digging of gum naturally raises the inference that the supply might be largely increased by large scale hydraulic sluicing. Total exports from New Zealand for the first quarter of 1931 and 1932 amounted respectively to 437 tons, valued at £22,999 and 543 tons valued at £19,661. While the statistics indicate a slight increase in quantity, prices were considerably lower due undoubtedly to a greater demand for lower grade gums.

New Use for Cellulose Acetate

"Light Protective" Medium for Cellulose Nitrate

INTERESTING facts concerning the absorption of light by films of cellulose acetate have been disclosed recently by The Eastman Kodak Co. (Brit. Pat. 371,901) which promise to have application in both the cellulose (nitrate) lacquer and the rayon industries. It will be remembered that some years ago it was discovered (Brit. Pat. 243,841) that dyeings on cellulose acetate rayon could be rendered much faster to light by the presence in the rayon of small amount of aromatic compounds, particularly dimethylaniline. Actually this discovery has not had much application since the normal dyes used for cellulose acetate rayon have generally good fastness to light and also because the presence of such amines may give the rayon an objectionable odour. The presence of a di-alkylaniline such as dimethylaniline in cellulose acetate has the effect of causing this to absorb all light rays below about 3,400AU: the ultra-violet light in sunlight is thus shielded from any dyestuff which may be present and fading of the dyestuff is thereby retarded. This effect may now be applied to the preservation of cellulose finishes on motor cars.

Practically all cellulose finishes on motor car bodies consist of a film of cellulose nitrate—usually a nitrate of low viscosity. Such a finish loses its lustre and brilliancy when exposed to sunlight since it is particularly sensitive to the action of ultra-violet light. Its life could therefore be extended if it could be coated with another film of a substance which would cut off the ultra-violet light. Cellulose acetate itself is not suitable since this substance has less absorptive power than cellulose nitrate, but the absorptive power of the acetate can be increased by the addition of aromatic compounds, thus becoming suitable as a protective medium.

According to the Kodak patent such substances include various polycyclic hydrocarbons in which are present two benzene rings fused together, for example, phenanthrene, naphthalene, chloronaphthalene, anthracene, and *o*-, *m*-, and *p*-diphenylbenzenes. In addition, various substances of a different type namely nitrobenzene, phthalimide, and *p*-aminobenzoic acid are also effective in increasing the light absorptive powers of cellulose acetate. Triphenylphosphate is a widely used plasticiser for cellulose acetate dopes and it is found that when present to the extent of 10 per cent. it increases the light absorption of the acetate, but the increase in itself is not sufficient to confer satisfactory light protection to a cellulose finish. A suitable dope for coating motor car bodies having a cellulose finish is prepared by incorporating 0.25 to 5.0 per cent. of phenanthrene or other aromatic compound in cellulose acetate together with 50 per cent. of a plasticiser, and then dissolving this in a mixture of solvents consisting of 15 per cent. ethyl acetate, 50 per cent. acetone, 20 per cent. ethyl lactate, and 15 per cent. denatured alcohol.

Catalytic Oxidation of Ammonia

Improvements Effected in Working Conditions

INTERESTING notes on the manufacture of nitric acid by the catalytic oxidation of ammonia appear in "Die Chemische Fabrike" for June 15. In the early days of the industry, temperatures of 600-700° C. and a contact period of 1/100 second were the usual working conditions, but considerable changes have taken place as a result of the use of purer grades of ammonia and more closely woven gauzes of purer platinum or platinum-rhodium. By improved methods for the removal of the heat generated during oxidation, the velocity of reaction has been speeded up to a remarkable degree, and contact periods of as little as 1/1000 second at a temperature of 1000° have recently been recorded. Not all synthetic nitric acid producers in Europe resort to such high temperatures; the more common procedure is to employ pure platinum at a temperature not exceeding 700° C.

Platinum-Osmium Alloys

The platinum gauze used was formerly woven by hand owing to the belief that platinum wire was less adaptable to mechanical weaving than copper or nickel. This difficulty has now been overcome by the introduction of special mechanically-operated looms, weaving by hand looms having been abandoned. Mechanical weaving limits the width of a single platinum gauze to 1 metre, but much larger sheets can be produced with the aid of autogenous welding. Until recent years, the ammonia industry made use of platinum or of an alloy containing 1 per cent. of iridium. It has now been found, however, that an alloy of platinum and rhodium is far superior to pure platinum, the addition of 10 per cent. of rhodium having proved to be most efficient. This combination results in a 2 to 4 per cent. increase in the yield of nitrogen oxides, whilst the life of the catalyst is prolonged. A diminution in weight is also effected owing to the much lower specific gravity of rhodium as compared with platinum, but owing to the fact that the platinum-rhodium alloy requires a higher temperature for ignition than platinum itself, it is necessary to work at a temperature of 900° or more. The value of osmium as a catalyst in ammonia oxidation has long been recognised and experiments with platinum-osmium alloys have given results which indicate that this metal may prove even more valuable than rhodium. The only catalyst of industrial importance which does not involve the use of platinum is a mixture of ferric oxide and bismuth oxide, as introduced in Germany in pre-war days. This contact material, which takes the form of a granular mass containing about 95 per cent. ferric oxide and 3 per cent. bismuth oxide has yielded extraordinary good results, a maximum yield of 95.6 per cent. having been obtained, with a contact period of 0.01 second.

The synthetic ammonia which is now available is of such a high degree of purity that risk of poisoning the catalyst has been almost entirely eliminated, although trouble is still likely to arise from the particles of iron oxide, oil and dust present in the air used for oxidation. The following data (supplied by Yee and Emett) are nevertheless of interest: 0.4 per cent. acetylene and 0.07 per cent. of sulphuretted hydrogen caused no poisoning; on the other hand, 2 parts of phosphoretted hydrogen in 100,000,000 parts of ammonia-air mixture reduced the yield by an average of 2.5 per cent. The above-mentioned quantity of sulphuretted hydrogen increased the oxidation yield by about 3.4 per cent., while the yield is further increased by 4.3 per cent. in the simultaneous presence of 0.00002 per cent. of phosphoretted hydrogen.

The World's Radium Supply

ACCORDING to the "Chemiker-Zeiting" June 18, between the years 1899 and 1922 a total of 205 grams of radium were produced throughout the world, including 154 grams in the United States and 23.5 grams in Czechslovakia. By the end of 1931 the world production had risen by a further 350 grams, giving a total to that date of 555 grams. In the course of the past two years the output has amounted to as much as 70 grams. The present price is £13 per mg., as compared with £24 per mg. in 1922. France, Belgium and the United States possess the greatest stocks of radium, whereas Germany is in the possession of only 1 gram.

Economic Conditions in Estonia

Preference for British Goods

ESTONIA, according to a report which has been prepared by the Department of Overseas Trade (H. M. Stationery Office, price 9d. net), shares with other countries the prevailing depression and economic anxiety. It is essentially an agricultural country, but there are a number of industrial undertakings, although not more than 50,000 workers out of a total population of 1,119,000 are engaged in industry. Estonians, generally, show great friendliness towards Great Britain and normally they will buy British goods for preference whenever prices are favourable. Although prices are now more favourable the present times are not normal and it is the actual policy to curtail, through the control by licence, the import of any but essential articles. The most important articles are those required for the industries, such as raw cotton, raw jute, iron and steel, naphtha products, and, to a more limited extent, coal and raw hides. Fertilisers (superphosphates) form another indispensable import, as also does sugar; shipments of sugar were resumed in March, 1932.

The production of cellulose, or wood-pulp, which jumped into second place in export value in 1931, has made steady progress in recent years. The present position is not so good and prospects are not bright because, as with paper, prices cannot compete with those of other timber-producing countries which have suspended the gold standard. The paper industry has been carrying on a precarious existence, mainly with Soviet contracts which terminated at the end of 1931 and have not been renewed. These contracts had existed with Estonian paper mills for over eleven years, but prices are no longer competitive with Finnish prices.

The are two cement works, one of which (with British capital) has been closed by arrangement, the market being insufficient for both. There was some export in 1931 (nearly 14,000 tons) but the quantity was only half that of two years before. The factory mines its own oil-shale (nearly 25,000 tons in 1931) which it uses as fuel, the waste product—about 50 per cent.—being utilised in cement making.

Oil Shale Industry

Much has been expected from this industry in Estonia, but the hopes of general prosperity, based upon the prospects of oil production, and particularly motor-spirit upon a large scale, must be deferred until this section of the industry has developed beyond the experimental stage through which it may be said to be still passing. A considerable amount of capital has been invested in the industry by the Estonian Government, in their own works, and by British, German and Swedish groups, in concessions granted to each, but success must ultimately depend upon whether production costs can be brought lower than those of naphtha products. It is too early to draw any general conclusions from the fact that the benzine (petrol) is sold on the home market with a protection which amounts in customs duty and road tax differentiation to Kr. 180 (approximately £10) per ton.

The production of shale has been about half-a-million tons during each of the last three years. More than half of the production in 1931 was mined at the State works. The shale, as such, is used as fuel but there is about 50 per cent. ash; it is used in some factories and also on the railways, some engines being still fitted for it, while the remainder have been converted to use the oil-shale fuel oil. The production of crude oil was about 17,000 tons in 1931 compared with about 10,000 tons in 1930. The State works accounted for most of the total (6,318 tons) in 1930 and more than a third of it in 1931. The British company, having experimented until they considered they had secured a superior retort, anticipates a largely increased output in future.

Utilisation of French Potash Deposits

THE production of potassium sulphate without sulphuric acid is the object of investigations recently published by engineers of the French domanial potash mines. Magnesium sulphate is apparently the intermediate product, obtained by treatment of dolomite magnesium chloride and gypsum, which is reacted with muriate of potash for the sulphate. No evaluation of the feasibility of the process is as yet available.

Low Temperature Carbonisation

New Uses for a By-Product

THE use of smokeless fuel on a large scale has been brought a stage nearer by the discovery at the Chemical Research Laboratory, Teddington, that one of the by-products of the low temperature carbonisation process can be used for the manufacture of mouldings. The by-product in question can be obtained at 0.2d. per lb., compared with 3½d. per lb. for the substance at present used. Another result of this discovery has been applied to a problem which, for many years, has puzzled exporters of wool to the tropics. Samples of wool wound on paper rolls prove to be perishable, but with a coating of the new by-product satisfactory results have been obtained at prices many times lower than has been possible hitherto.

Heat Transfer Calculations

Fluids Flowing Under Turbulent Conditions

A METHOD of directly calculating heat transfer coefficients for fluid flowing in pipes under turbulent conditions from existing data on pipe friction and velocity distribution is contributed by E. V. Murphree (Standard Oil Company of Louisiana) to the July issue of "Industrial and Engineering Chemistry." The method given is strictly applicable only to cases where the temperature gradient is such that the physical properties of the fluid do not appreciably vary across the pipe cross section. For other cases an arbitrary correction may be made by taking the physical properties of the fluid to correspond to a temperature between the average temperature of the fluid when mixed and that of the pipe wall. The calculated coefficients are compared with published experimental results on gases, water, and oils. The correlation, while by no means perfect, is believed to be at least as satisfactory as any so far presented. The possibilities are mentioned of applying the author's method of calculation to other diffusional processes such as dehumidification and absorption, and to other types of fluid flow such as flow perpendicular to tubes and through tower packing.

The Beet Sugar Industry

Employment Statistics

IN 1931, the beet sugar industry entered on the final stage of the subsidy provided under the Beet Sugar (Subsidy) Act, 1925, in accordance with which a further reduction in the amount of the subsidy was due. According to returns compiled by the Ministry of Agriculture and Fisheries, the area under cultivation of sugar beet was 234,000 acres in 1931, compared with 348,900 acres in 1930 and 234,500 acres in 1929. Cultivation was almost entirely confined to South-Eastern, the Midlands, North-Eastern and South-Western England; and from each area reports were received of a large reduction in the number of work-people placed in employment on field work during 1931, due mainly to the decreased acreage under cultivation.

The total number of workpeople placed on field work during 1931 was 3,407, compared with 5,923 in 1930. There was an increase in the number of workpeople placed in employment through exchanges in several of the beet-sugar factories. During 1931, 5,709 placings were effected, compared with 4,207 in the previous year, in spite of the fact that the crop produced was substantially less than in 1930. This increase was attributed to the growing practice on the part of the factories of undertaking the refining of raw cane sugar. In one factory at Cupar, Fife, 804 workpeople were placed, compared with 27 in 1930. It is stated that sugar refining is now the main work of this factory, and that the manufacture of beet sugar occupies only a few weeks in the year. In the Midlands also the number of placings in factories increased substantially, being 1,666, compared with 1,309 in 1930. In South-Eastern England, 1,162 placings were effected in 1931, against 1,142 in 1930; while in North-Eastern England the number increased from 1,571 in 1930 to 2,077 in 1931. There is only one factory in the South-West, and this is engaged solely in research work.

Synthetic Ammonia in Japan

Works of the Showa Fertiliser Co.

INTERESTING notes on the synthetic ammonia works of the Showa Fertiliser Co., at Kawasaki (Japan), are given in the June issue of the "Journal of the Society of Chemical Industry, Japan."

For the synthesis of ammonia, there are now in Japan a total of seven works belonging to six different companies, among which the Showa Hiryo is unique in that the process is of Japanese origin and all the equipments except the air-fractionating columns were designed and constructed in this country. The company was founded in October, 1928, by two of the largest electric power companies of eastern Japan, namely, Tokoy Dento K.K. and Toshin Denki K.K., for the purpose of disposing the large amount of surplus water power. At first, a lime-nitrogen factory was erected in Kanose, Niigataken, of capacity 60,000 tons lime-nitrogen per year. At the time of founding the company, it was already fixed that an ammonia works was to be erected, but not that which one of the existing various processes should be adopted. In June, 1929, after the deliberate consideration, the staff of the company chose the process that had been worked out by the Nitrogen Research Laboratory of the Department of Commerce and Industry. Although the process had been well studied in the laboratory in a small scale, it had never been tried in the technical scale, and the decision of the company was considered somewhat risky in certain quarters, but it has now proved the complete success.

In July, 1930, the site of the works was fixed at Kawasaki, an industrial town at about 20 kilometres distance from the centre of Tokyo. The site covers an area of 165,000 sq. m. at a place of utmost transport facilities either by land or sea. The erection of the plant began in September, 1930, and already in April it was producing ammonia. The annual capacity at present is 30,000 tons of fixed nitrogen or 150,000 tons of ammonium sulphate. This plant is the third largest in the world among the synthetic ammonia plants using electrolytic hydrogen, the largest being the Norst Hydro in Norway, the second the Chosen Chisso in Korea.

Electrolytic Cell Design

The electric power is received at 60,000 volts and stepped down to 350 volts in the works. At present about 70,000 kW is used usually, although 80,000 kW is in contraction. For the electrolysis of water, it is converted into direct current by means of 10 units of 6,000 kW rotary convertors constructed by the Hitachi Electric Machinery Works. The electrolytic cell house occupies an area of 12,500 sq. m. and comprises 2,500 cells, arranged in 10 batteries, producing hourly 12,000 cu.m. of hydrogen and a half of it oxygen. Each battery is of 600 volts and 10,000 amperes with 250 cells in series. The cells were constructed by the Hitachi Works. The cell design is that of the Nitrogen Research Laboratory, but much improved later in details by the Hitachi works. Each cell contains 2 tons of caustic soda in the form of a 20 per cent. solution, and produces 4.4 to 5.0 cu.m. hydrogen hourly at 2.1 to 2.4 volts, working at temperatures not exceeding 70° C., with current density 5 amperes per sq. dm. usually, about 5 kWh being consumed per cu.m. hydrogen at the normal rate of working. The cooling method of the cell is novel, it being done by the blast of air. About 240 tons of distilled water is required daily. Nitrogen is produced by four units of Linde apparatus, three of which are working normally, each unit producing 1,200 cu.m. of nitrogen in an hour. These fractionating columns are the only apparatus imported from abroad. The air compressor for them were made by Kobe Seikosho, each of 1,600 cu.m. per hour and 550 h.p.

For the synthesis of ammonia, there are six units in the system, each producing 20 tons of ammonia per day. Compressors and circulating pumps working at 300 atmospheres were made by Kobe Seikosho and Ishikawajima Works. The high pressure tube system working at 300 atmospheres, comprising the high pressure purifiers, driers, heat exchangers and catalyser tubes (nickel steel) were all made by Nihon Seikosho. The heating of catalyser tubes is done electrically, consuming 60 kVA at the start, but far less under normal continuous running.

Historical Scientific Apparatus

Importance of Preservation

LORD RUTHERFORD and others have lately appealed for the co-operation of anyone possessing pieces of apparatus likely to be of historial importance. In 1925 the Institute of Physics appointed a committee to advise on the preservation of such apparatus. This committee is anxious to trace any pieces with which fundamental research in physical science has been carried out, and to arrange for their preservation. The committee has also entered upon the task of drawing up a catalogue of such pieces. Several pieces of great historical importance have already been secured for the nation, and are now housed in the Science Museum at South Kensington, and recent appeals have brought to light several other important pieces. Articles describing and cataloguing such pieces are published from time to time in the "Journal of Scientific Instruments."

Many of our readers may have such apparatus in their possession or under their charge, and the Secretary of the Institute of Physics, 1 Lowther Gardens, Exhibition Road, London, S.W.7, will be grateful for any information that will assist in tracing such pieces or in completing the catalogue. For the benefit of future historians of physical science it is desirable to have as complete a record as is possible of the work of British physicists, and it is to this end that this task has been undertaken.

Spanish Imports and Exports

Cheering Prospects

IN a report on economic and trade conditions in Spain as at the end of May last, issued by the Department of Overseas Trade, the Commercial Secretary to the British Embassy at Madrid states that the economic condition of Spain at the present moment must be looked at through the veil of world-wide disturbance and depression. In comparison with this gloomy foreground the prospects for Spain itself appear rather cheering than the reverse. It is true that a full return to economic stability as an independent unit is denied to the country until her chief customers have definitely made a turn for the better. This turn for the better should include the possibility of the investment of capital in Spain in permanent undertakings, because the national balance of accounts has been in the past, and probably will be in the future, on the debit side, unless there exists a flow of foreign investment into the country.

Trade statistics for 1931 are given in the report. The "declared" values evidence an adverse trade balance of 216 million gold pesetas, exclusive of gold and silver bullion movements. The importation of petrol, paraffin and lubricants amounted to 661,507 tons, as compared with 609,664 tons in 1930, and 460,719 tons in 1929. Coal by-products imports (not including colours) show an increase of 17,000 tons over 1930 (63,000 tons, compared with 46,000). Chemical fertiliser imports also show an increase over 1930, the figures being 422,000 tons against 361,000.

Imports of raw rubber, manufactured rubber, etc., all showed a considerable decline, as will be seen from the following figures:—Raw rubber and rubber waste, 9,814 tons against 15,899; manufactured rubber, 3,496 tons against 5,769; waterproof textiles, etc., 418 tons against 907.

An all round decrease in exports was shown in 1931, as will be seen by the following comparisons of the most important items:—

	1929. Tons.	1930. Tons.	1931. Tons.
Iron Ore	5,594,537	3,724,281	1,872,877
Iron Pyrites ...	1,809,865	1,980,327	1,396,795
Copper Ore ...	910,095	767,479	510,982
Olive Oil	51,370	106,903	93,859
Mercury	871	609	469

Expectations of increases in exports resulting from the continued low level of the peseta exchange were belied by two factors—the purchasing capacity of the world market for these exports sank to extreme depths in 1931 as a result of widespread economic depression, whilst in addition, the agricultural harvests in Spain were adversely affected by the drought at the beginning of the year.

Steady Increase in Dyestuffs Licences

Review of the Past Eleven Years

SIR HENRY SUTCLIFFE SMITH, in his presidential address at the annual meeting of the Colour Users' Association at Manchester on July 26, presented the following summary, furnished by the Board of Trade, showing quantities and values of licences granted by the Dyestuffs Advisory Licensing Committee.

There has been a steady increase almost year by year, and in 1931 the weight of colour licensed for importation amounted to nearly 6,500,000 lb. This is an increase of 17 per cent. on the 1930 weight. The number of licences dealt with aggregated 6,822 as against 6,000 in 1930. This increase in importation is indicative of the progressive methods employed by the foreign manufacturers notwithstanding the restrictions of the Dyestuffs (Import Regulation) Act. Additions to their already extensive list of dyestuffs is a regular feature of the service given by the German and Swiss makers.

Year.	For importation from Germany.		For importation from Switzerland.		For importation from Other Sources.		Total.	
	lb.	Value. £	lb.	Value. £	lb.	Value. £	lb.	Value. £
1921	671,032	197,466	1 796,754	763,299	209,719	82,056	2,677,505	1,042,821
1922	1,325,671	375,675	1,638,235	694,740	270,987	33,404	3,234,893	1,103,819
1923	1,817,571	493,499	1,412,616	459,861	461,253	36,177	3,691,440	989,537
1924	1,805,145	398,226	1,191,931	363,513	39,158	9,204	3,036,234	770,943
1925	2,175,262	334,749	1,157,270	307,754	66,522	9,081	3,399,054	651,584
1926	2,949,858	599,157	1,190,951	333,448	91,778	11,402	4,232,587	944,007
1927	3,644,152	710,938	1,230,815	306,595	115,389	16,480	4,990,356	1,034,013
1928	3,534,935	729,393	1,373,226	335,226	122,350	9,494	5,030,511	1,074,113
1929	3,899,412	743,951	1,787,796	402,788	127,069	11,385	5,814,277	1,158,124
1930	3,774,882	712,946	1,506,996	360,252	248,605	14,331	5,530,483	1,087,529
1931	4,123,153	837,960	2,191,109	519,909	158,641	14,259	6,472,903	1,372,128

Utilisation of Beet Molasses

Dealing with Low-Grade Material

ONE of the problems of the beet sugar industry has been the disposal of large quantities of beet molasses—the residue from the manufacturing process after the extraction of as much sugar as possible by crystallisation. Various chemical methods for recovery of the sugar have been employed. In American practice the Steffen process is extensively operated, the sugar being precipitated by means of finely ground lime as an insoluble calcium saccharate. The so-called discard molasses, produced in turn by factories equipped with the Steffen process, which like all molasses contains about 50 per cent. sugar, contains also a considerable accumulation of raffinose and other impurities so that it cannot profitably be reworked by ordinary methods.

The advantage of the barium saccharate process in producing a saccharate of high purity from low-grade molasses has long been recognised, but as the reagent is an expensive one, it is necessary to recover it by reconverting the barium carbonate into oxide. The difficulty of carrying out this reaction in large quantities on a commercial scale has been the stumbling block that has retarded the development of this process. At the Johnstown Molasses Refinery in the United States, however, the discard molasses from the ten Steffen factories of the Great Western Sugar Co. is handled and the plant operates throughout the year. The barium carbonate mixed with silica, is heated in a rotary kiln fired with natural gas at a temperature somewhat below that of the ordinary cement kiln. The proportions are such that a di-barium silicate is formed, which hydrolyses on extraction with hot water yielding insoluble mono-barium silicate and a solution of barium hydroxide, from which the crystalline reagent is recovered by cooling. A solution of the barium hydroxide is used to precipitate the sugar from the molasses in the form of mono-barium saccharate, which is decomposed with carbon dioxide to form barium carbonate, the sugar going into solution. The barium carbonate is returned to the barium regeneration plant, while the sugar solution is further purified, is concentrated by evaporation, is passed through bone-char filters, and is then boiled in vacuum pans in a series of five boilings.

A large division of this refinery consists of the chemical plant for the regeneration of the barium. Numerous chemical engineering problems have had to be solved, and the equipment is extensive and interesting, some of it of novel design, including, besides the kilns, agitators, thickeners, crystallisers, filters, carbonators, etc., for the various reactions involved. The Moore leaf filter is used for the filtration of the precipitated barium saccharate. The sugar product is of such a high degree of purity that it is used to meet particularly rigid specifications in the manufacture of candy and other food products.

U.S. Phosphate Rock Industry

Statistics for 1931

IN 1931 the phosphate-rock industry in the United States reversed its previous upward trend. Reports of producers of phosphate rock in the the United States in 1931 reveal that, as compared with 1930, there was a curtailment of 41 per cent. in demand for phosphate rock produced during the year for consumption in the United States, and a decrease of 23 per cent. in demand for domestic rock for export. Total mine production and shipments fell 35 per cent. below the relatively high record made in 1930, and the total value of all domestic phosphate rock sold in 1931 dropped 34 per cent., as compared with 1930. Foreign demand likewise declined in 1931.

Total shipments of Florida rock were less in quantity than for many years since 1922, and the value was lower than for any year since 1918. Shipments of Florida hard rock which, with few reactions, have pursued a downward trend since 1907, declined to a point which was the lowest of any year for which figures have been recorded by the Bureau of Mines, with the exception of 1915 to 1917, inclusive. Land-pebble shipments from Florida, which have grown from a minimum of about 155,000 long tons in 1898 to a maximum of about 3,166,000 tons in 1930, and which were over 2,000,000 tons from 1923 to 1928, inclusive, and exceeded 3,000,000 long tons in 1929 and 1930, dropped in 1931 to a point slightly above that of 1922, when about 1,870,000, tons were shipped. With one exception (1921), the total quantity of grown and blue rock sold in Tennessee in 1931 was less than for any year since 1909, and the value was the lowest since 1910.

Conditions in the Western States, however, showed noteworthy improvement, as compared with all previous years. This field, which was discovered in 1906, and which at present commercially comprises Idaho, Montana and Wyoming, showed gains in shipments which exceeded the former banner year of 1926 by 79 per cent. in quantity and 69 per cent. in value. As compared with 1930 the quantity and value sold showed increases of more than 90 and 100 per cent. respectively.

Caustic Alkalies in Pellet Form

PELLETS of sodium and potassium hydroxide of a purity conforming to analytical standards are now manufactured by both British and Continental firms. They offer a number of decided advantages over the pure sticks in general use. The greater speed at which a given quantity can be weighed cuts down the carbon dioxide and water-absorption figures, while the shape lends itself unusually well to the filling of gas absorption tubes and the like. Material losses and contamination by dirt such as inevitably follow attempts to break up the sticks are automatically ruled out and dissolution in water takes place with much greater rapidity.

New Technical Books

TECHNICAL DATA ON FUEL. Edited by H. M. Spiers. Third edition. 302 Pp. London: The British National Committee, World Power Conference. 12s. 6d. net.

The first edition of "Technical Data on Fuel" was originally planned as one of the British contributions to the Fuel Conference, held in London as a sectional meeting of the World Power Conference in 1928, and the possibility of a need for further editions was not then visualised. The support extended to the publication has, however, been so great that three editions have now been issued during a period of less than four years. Further data have been added and the contents are now approximately 75 per cent. greater than the contents of the first edition. The volume has been prepared with the close co-operation of some of the leading fuel technologists in the country, and the preface is contributed by Dr. E. W. Smith, chairman of the Technical Data on Fuel Committee, who points out that no attempt at completeness has been made, for that would have involved a volume as large as one of the well-known engineers' handbooks. Consequently the selection of the subject-matter has been somewhat arbitrary, some of it being of general application and some of a specialised character. Data such as are readily available have been deliberately omitted though in some cases it has been felt desirable not to act strictly in accordance with this principle. In the case of some of the subjects dealt with, published information is of a conflicting nature, due to the experimental difficulties involved, and it has been necessary to exercise discrimination in the choice of what may be regarded as reasonably accurate data. The organisations with which the members of the committee are concerned have, in many instances, been in possession of practical evidence as to the reliability of some of the data and have freely placed their experience at the disposal of the committee. In other instances, and particularly where manufactured products such as refractory bricks are concerned, variations due to differences in the raw materials are involved, and it has then been necessary either to give indications as to the range of variation encountered in actual practice or to give what may be regarded as typical values. Careful consideration has been given to the question of units. The fact that British units continue to be used side by side with metric units, and that the need often arises of converting information from the one system to the other, has been met by the inclusion of a long table of conversion factors and by many references in the text to factors often required in connection with particular tables. It was the intention of rendering all the data in C.G.S. units, but in the case of the tables dealing with the properties of steam and of refrigerants it was felt that the British needs would best be served by the presentation of this matter in F.P.S. units. The latest table of atomic weights has been included, but corresponding alterations have not been made in the fuel tables in which atomic weights are involved, since the alterations in the atomic weights concerned are sufficiently small to render this unnecessary.

New material in the third edition includes:—Tables of logarithms, etc. (a number of users have asked for these): British Standard test sieves; thermometric lag; standard V.D.I. orifices and nozzles; flow of fluids in pipes (new charts have been added). hygrometric table—relative humidity of air; properties of saturated steam (new values are given, taken from the tables issued in 1931); properties of saturated vapour of diphenyl, diphenyl oxide and mercury (these tables have been included in view of new applications of the materials for heat exchange purposes or for turbines); flame radiation—radiation from carbon dioxide and water vapour; temperature distribution in unsteady heat flow; permeability of refractory materials to gases; mean specific heat of waste gas from gaseous fuels; detonation of liquid fuels—anti-knock compounds (revised); adsorptive efficiencies of wash oils for benzol recovery; molecular heat of reactions and the application of thermodynamic relations.

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REPORTS ON THE PROGRESS OF NAPHTHOLOGY, 1930-31. Institution of Petroleum Technologists. 10s. 6d. net.

This collection of papers is reprinted from the "Journal" of the Institution, April and May, 1932. The geology of petroleum is dealt with by James Romanes; oil field practice by A. Beeby Thompson and Ashley Carter; present trends in oil pipe lines by R. P. Bascon; American refinery technology, by Benjamin T. Brooks; refining in Asia and Europe by C. E. Spearing and S. Pilat; cracking by Gustar Egloff, B. L. Levinson and M. Herrmann; distillation and fractionation equipment by W. A. Peters; gum formation and its inhibition in motor spirits by W. H. Thomas; kerosene and white spirit by Walter A. Woodrow; lubricants by E. A. Evans; gas oils, Diesel oils and fuel oils by F. A. Garner; oil engines by P. N. Evarett; asphalts and road materials by F. Levy; benzole by W. H. Coleman; low temperature carbonisation and low temperature tar by M. A. Matthews; analysis and testing by A. W. Cox; and the chemistry of petroleum by H. J. Waterman, A. J. Tulleners and W. C. Webber. There is also a contribution by E. B. Evans, dealing with special products such as acids and bases, antifreeze compounds, carbon and lamp blacks, helium, insecticides, paraffin wax and solvents. In the latter contribution it is pointed out that a noteworthy feature of the past few years has been the rapid rise in importance of industrial solvents derived from petroleum. Acetone, methyl, isopropyl, and amyl alcohols, ethylene glycol, acetates, chloro-compounds and hydrocarbons are now manufactured in bulk, and represent a large and growing industry. Liquefied butane is now another important article of commerce in the United States, where large quantities are transported in cylinders and tank-cars for use in industrial and domestic heating, welding, etc. Acetylene is polymerised to vinyl-acetylene, and to this hydrogen chloride is added to give the product known as "chloroprene" which polymerises on standing to form rubber-like materials which have distinct possibilities. Another product which has assumed great importance recently in America is carbon dioxide, which has an entensive use as a refrigerant under the name "dry ice." Large quantities of gas containing about 95 per cent. carbon dioxide and 5 per cent. of combustible gases are obtained from wells on the Quebrache oilfield, and pure solid carbon dioxide can be prepared from this gas and shipped for use as a refrigerant. The Carbonic Products Co. is now treating 175,000 cu. ft. of natural gas, producing six tons of liquid and solid carbon dioxide per day.

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CHEMICAL ENCYCLOPÆDIA: A DIGEST OF CHEMISTRY AND ITS INDUSTRIAL APPLICATIONS. By C. T. Kingzett. Fifth edition. Pp. 1,014. London: Baillière, Tindall and Cox. 40s. net.

In the fifth edition of this work there are 200 additional pages of information, as compared with the fourth edition. A considerable amount of space has now been devoted to bibliographical notes, but the available literature has not been digested as thoroughly as it might have been, little discrimination having been made between important and unimportant matter. Apart from its value to manufacturers, the book should also find extended use among merchants, company directors and others who need the elucidation of matters appertaining to chemicals and their uses in industry.

* * *

ADULTERATION AND ANALYSIS OF FOODS AND DRUGS. By J. F. Liverseege. Pp. 599. London: J. and A. Churchill. 30s. net.

This book is intended for those who are actually concerned with the administration of the Food and Drugs Act, public analysts and sampling officers, and solicitors involved in prosecution under the Act. The author was formerly public analyst to the City of Birmingham, and he has successfully accomplished the task of giving an account of the analytical methods, research and memoranda which have been found useful during his forty-three years' experience in the municipal laboratory. Particulars are given as to the nature and proportion of adulterations detected in Birmingham. The abstracts of about 1,400 prosecutions, gathered from all parts of England, have been selected to show the variation in adulteration of a particular food or drug, and in many cases the arguments which led to the conviction or acquittal of a defendant.

An index to appeal cases is provided, and included in the general index are references by which the use of preservatives and adulterants can be traced.

News from the Allied Industries

Tar Distillation

OWING TO THE UNECONOMIC SELLING PRICES in the petroleum trade, the profits of Major and Co. for the year ended March 31, 1932, were insufficient to cover depreciation and interest on bank loans. Consequently there is a debit balance of £2,127 in the profit and loss account, after provision for these items, compared with a net profit of £13,739 the previous year. Sundry creditors stand at £38,228, while sundry debtors amount to £34,742, and cash to £912. The bank loan at £79,340 shows a slight increase from last year.

Non-Ferrous Metals

THE LAST ZINC MINE in East Upper Silesia belonging to the Hohenlohe Works Co. has been closed down. The staff of 700 workers have been dismissed. In consequence, the total Polish zinc output has been stopped.

A NEW SWEDISH COPPER DEPOSIT has been reported to the Geological Survey Department from Malaa, in Skellsfte district of Northern Sweden. This new deposit belongs to the same district as the rich mining field of Boliden, and seems to hold the same high percentage of copper as the recent Knorbevare finds in that region.

Mineral Oil

THE OIL CONFERENCE in Paris has concluded. The Anglo-Dutch and American delegates have initialled an agreement with the Roumanians on oil quotas. The delegates are now going home to submit the agreement for ratification to their principals—in the case of the Roumanians, the Roumanian Government. The agreement will come into force immediately on ratification. The conference lasted a month. The deliberations were all the time in secret, and the delegates now—though apparently satisfied with the result, and confident of ratification—are silent as regards details. It is understood, however, that it has been agreed to stabilise the exports of Roumanian and Anglo-American producers at their present levels.

Coal Carbonisation

THE STATUTORY FIRST MEETINGS of the creditors and shareholders of Parent Coal Carbonisation Trust, Ltd., were held in London on July 26. The prospectus, it was stated, set forth that a profit of £182,500 per annum could be eventually expected from a plant capable of treating 1,000 tons of cannel coal per day. Agreements were entered into with a Mr. Aicher in respect of services to be rendered and with Maisels Petroleum Trust for the supply of 5,000,000 tons of cannel coal. The meagre response to the prospectus rendered the issue a failure, and the Official Receiver was of opinion that the board was not justified in going to allotment. Debentures for £10,000 were issued to secure a bank loan, and on July 5 the bondholders appointed a receiver on their behalf. The failure of the company was attributed to lack of capital with which to carry out its programme.

Rubber

THE FUTURE OF THE RUBBER INDUSTRY is discussed in the current issue of the "Financial and Economic Review" of the Amsterdamsche Bank in an article entitled "Considerations with Regard to the Rubber Crisis," by J. G. Fol, secretary of the Research Department of the International Association for Rubber and Other Cultivations in the Netherlands-Indies. The chief hope of the industry, it is stated, is increased consumption. So far as the consumption in the motor tyre industry is concerned, no important improvement can be expected until the economic depression is past. The desired improvement in outlet will have to come from the development of other existing applications for rubber, and, still more important, by the discovery of entirely new applications by means of scientific technical research work. If all rubber producers would regard the necessary financial contributions not as optional contributions but as an indispensable part of ordinary overhead charges, so that research work could be undertaken on a scale more in keeping with the extent and the needs of the industry, there is no doubt that it would be possible to increase very considerably the consumption of rubber.

China Clay

THE SITUATION IN THE CHINA CLAY FIELDS is revealed in the annual report of Lovering China Clays, Ltd., the second largest china clay producing firm in the industry which states that the sales for 1931 were more than maintained, despite the serious fall in the world's demand for British clay. Prices, however, continued to fall and a further loss from that experienced in the preceding year is disclosed. During the year the expenditure on improvements and expansion at the Meloder works has been practically completed, and it is confidently hoped that this property will make a greater contribution towards the company's income, than has been possible previously, and so justify the expenditure incurred.

Iron and Steel

THE JOINT AUTUMN MEETING of the Iron and Steel Institute and the Institute of Metals will take place in London from September 12 to 15. The business sessions will be held in the rooms of the Institution of Civil Engineers, Great George Street, S.W.1, and of the Institution of Mechanical Engineers, Storey's Gate, S.W.1. On the opening day the annual autumn lecture of the Institute of Metals will be delivered by Dr. H. J. Gough, M.B.E. the subject being "Corrosion Fatigue in Metals." A large number of papers will be read or discussed by correspondence, and visits will be paid to the General Electric Co.'s research laboratories at Wembley, the Acton refinery of the Mond Nickel Co., and the Ford Motor Co.'s Dagenham Works.

IN ORDER TO EFFECT ECONOMIES in the production of pig iron for the foundries, the Staveley Coal and Iron Co. has built and put into commission two new cupolas of the balanced blast type developed by the British Cast Iron Research Association. In comparison with the older internal diameter cupola, the operation of smelting is quicker and a saving in labour costs is effected.

Canadian Trade Mark Law

Important Changes

THE Canadian Parliament has passed an Act effective September 1, 1932, which supersedes the present Trade Mark Act. Amongst other essential changes in the Canadian law of trade marks, this Act eliminates the well established common law principle that ownership of a trade mark is acquired by user and not by registration. It makes registration necessary only to complete title to a trade mark but also to oust any adverse rights that may have been acquired in the interval between user and registration. The prior use of a trade mark by a person who has not registered his ownership thereof, will not confer upon him any right or title as against another who registered the same or a closely similar mark. Unregistered trade marks, therefore, must now be registered to overcome the danger of having them appropriated by another. Present users, however, are given a limited time to effect registration.

The term under the new Act has been reduced to fifteen years, and there will no longer be any distinction between general and specific trade marks. Trade marks consisting of a word mark and a design mark (device, picture, etc.), must be registered twice under the new Act, if protection is desired for both the word mark and the design mark. Hence, such a combination trade mark now registered as a word mark, should be registered as a design mark under the new Act, and vice versa. The new Act also forbids the registration of a mark which is the name of a person, firm or corporation, or which is clearly descriptive or mis-descriptive of the character, quality, place of origin, etc., of the goods.

Colours for Wool-Acetate Artificial Silk

THE Geigy Colour Co., Ltd., of Manchester, have just issued a pattern card, showing wool-acetate artificial silk shades for winter 1932-33. About forty shades are given, dyeing instructions being in English, German, French, Spanish and other languages.

Weekly Prices of British Chemical Products

Review of Current Market Conditions

The following notes on the chemical market conditions in Great Britain are based on direct information supplied by the British manufacturers concerned, and unless otherwise qualified the figures quoted apply to fair quantities, net and naked at makers' works. Where no locality is indicated, the prices are general for the United Kingdom. Particulars of the London chemical market are specially supplied to THE CHEMICAL AGE by R. W. Greeff and Co., Ltd., and Chas. Page and Co., Ltd., and those of the Scottish chemical market by Chas. Tennant and Co., Ltd.

THERE has been a fair volume of business booked in the London chemical market this week and markets show little change, the undertone being steady. The market for coal tar products remains quiet, with no alterations in prices from last week. Whilst most of the principal lines of chemicals on the Manchester market during the past week have been steady to firm, the fact remains that the few changes that have occurred, as has been the case during recent weeks, have been towards slightly lower levels. For the time being, buyers are only operating on very moderate lines and there is no disposition to extend fresh commitments beyond early requirements. Few new contracts of any weight have been reported, though specifications against existing contracts are coming through fairly well allowing for the time of the year and the condition of the consuming industries. The Glasgow Fair holidays are still having their effect on the Scottish market, business being quiet.

General Chemicals

ACETONE.—LONDON: £65 to £68 per ton; SCOTLAND: £66 to £68 ex wharf, according to quantity.

ACID, ACETIC.—Tech. 80%, £37 5s. to £39 5s.; pure 80% £38 5s. to £40 5s.; tech., 40%, £19 15s. to £21 15s.; tech., 60%, £28 10s. to £30 10s. SCOTLAND: Glacial 98/100%, £48 to £50; pure 80%, £38 5s.; tech. 80%, £37 5s. d/d buyers' premises Great Britain. MANCHESTER: 80%, commercial, £39; tech. glacial, £52.

ACID, BORIC.—SCOTLAND: Granulated commercial, £26 10s. per ton; B.P. crystals, £35 10s.; B.P. powder, £36 10s. in 1-cwt. bags d/d free Great Britain in one-ton lots upwards.

ACID, CHROMIC.—11d. per lb., less 2½% d/d U.K.

ACID, CITRIC.—1s. 0½d. per lb. LONDON: 1s. 1d., less 5%. MANCHESTER: 1s. 1¼d. to 1s. 0⅞d.

ACID, CRESYLIC.—97/99%, 1s. 5d. to 1s. 7d. per gal.; 99/100%, 1s. 9d. to 2s.

ACID, FORMIC.—LONDON: £48 per ton.

ACID, HYDROCHLORIC.—Spot, 3s. 9d. to 6s. carboy d/d according to purity, strength and locality. SCOTLAND: Arsenical quality, 4s.; dearsenicated, 5s. ex works, full wagon loads.

ACID, LACTIC.—LANCASHIRE: Dark tech., 50% by vol., £24 10s. per ton; 50% by weight, £28 10s.; pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £53; edible, 50% by vol., £41. One-ton lots ex works, barrels free.

ACID, NITRIC.—80° Tw. spot, £20 to £25 per ton makers' works, according to district and quality. SCOTLAND: 80°, £23 ex station full truck loads.

ACID, OXALIC.—LONDON: £45 10s. per ton in casks, £48 10s. to £52 10s. in kegs. SCOTLAND: 98/100%, £49 to £52 ex store. MANCHESTER: £47, ex store.

ACID, SULPHURIC.—Average prices f.o.r. British makers' works, with slight variations owing to local considerations: 140° Tw. crude acid, £3 per ton; 168° Tw. arsenical £5 10s.; 168° Tw. non-arsenical, £6 15s. SCOTLAND: 144° quality, £3 12s. 6d.; 168°, £7; dearsenicated, 20s. per ton extra.

ACID, TARTARIC.—1s. 0½d. per lb. SCOTLAND: B.P. crystals, 1s. 1d. to 1s. 1½d. less 5% carriage paid. MANCHESTER: 1s. 1¼d. to 1s. 0½d.

ALUM.—SCOTLAND: Lump potash, £9 per ton ex store.

ALUMINA SULPHATE.—LONDON: £8 5s. to £9 10s. per ton. SCOTLAND: £8 to £8 10s. ex store.

AMMONIA, ANHYDROUS.—Spot, 10d. per lb. d/d in cylinders. SCOTLAND: 10d. to 1s. containers extra and returnable.

AMMONIA, LIQUID.—SCOTLAND: 80°, 2½d. to 3d. per lb. d/d.

AMMONIUM BICHROMATE.—8d. per lb. d/d U.K.

AMMONIUM CARBONATE.—SCOTLAND: Lump, £36 per ton; powdered, £38, in 5-cwt. casks d/d U.K. stations or f.o.b. U.K. ports.

AMMONIUM CHLORIDE.—£37 to £45 per ton, carriage paid. LONDON: Fine white crystals, £19 to £20. (See also Salammoniac.)

AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton, carriage paid according to quantity. (See also Salammoniac.)

ANTIMONY OXIDE.—SCOTLAND: Spot, £22 per ton, c.i.f. U.K. ports.

ANTIMONY SULPHIDE.—Golden 6½d. to 1s. 1½d. per lb.; crimson, 1s. 4d. to 1s. 6d. per lb. according to quality.

ARSENIC.—LONDON: £24 10s. c.i.f. main U.K. ports for imported material; Cornish nominal, £26 10s. f.o.r. mines. SCOTLAND: White powdered £27 ex wharf; spot, £27 10s. ex store. MANCHESTER: White powdered Cornish, £26 at mines.

ARSENIC SULPHIDE.—Yellow 1s. 6d. to 1s. 8d. per lb.

BARIUM CHLORIDE.—£11 to £11 10s. per ton.

BISULPHITE OF LIME.—£7 10s. per ton f.o.r. London, packages free.

BLEACHING POWDER.—Spot 35/37% £7 10s. per ton d/d station in casks, special terms for contract. SCOTLAND: £8 15s. in 5/6 cwt. casks.

BORAX, COMMERCIAL.—Granulated £15 10s. per ton, powder £17. packed in 1-cwt. bags, carriage paid any station Great Britain. Prices are for 1-ton lots and upwards.

CADMIUM SULPHIDE.—3s. 6d. to 3s. 9d. per lb.

CALCIUM CHLORIDE.—Solid 70/75% spot £5 5s. to £5 15s. per ton d/d station in drums.

CARBON BISULPHIDE.—£30 to £32 per ton, drums extra.

CARBON BLACK.—4½d. to 5½d. per lb., ex wharf.

CARBON TETRACHLORIDE.—£45 to £55 per ton, drums extra.

CHROMIUM OXIDE.—10d. to 10½d. per lb. according to quantity d/d U.K. Green 1s. 2d. per lb.

CHROMETAN.—Crystals 3½d. per lb. Liquor £19 10s. per ton d/d.

COPPERAS (GREEN).—SCOTLAND: £3 15s. per ton, f.o.r., or ex works.

CREAM OF TARTAR.—LONDON: £5 to £5 3s. 6d. per cwt.

FORMALDEHYDE.—LONDON: £28 to £30 per ton. SCOTLAND: 40%, £28 10s. ex store.

LAMPBLACK.—£46 to £50 per ton.

LEAD, ACETATE.—LONDON: White, £36 to £37 per ton. Brown £1 per ton less. SCOTLAND: White Crystals £40 to £41 c.i.f. U.K. ports. Brown £1 per ton less. MANCHESTER: White, £34; Brown, £32.

LEAD NITRATE.—£28 per ton. MANCHESTER: £27 10s.

LEAD, RED.—SCOTLAND: £28 10s. per ton d/d buyer's works.

LEAD, WHITE.—SCOTLAND: £40 per ton carriage paid.

LITHOPONE.—30%, £19 to £21 per ton.

MAGNESITE.—SCOTLAND: Ground Calcined £9 per ton ex store.

METHYLATED SPIRIT.—61 O.P. Industrial 1s. 8d. to 2s. 3d. gal. Pyridinised Industrial, 1s. 10d. to 2s. 5d. Mineralised, 2s. 9d. to 3s. 3d. 64 O.P. 1d. extra in all cases. Prices according to quantities. SCOTLAND: Industrial 64 O.P., 1s. 9d. to 2s. 4d.

NICKEL AMMONIUM SULPHATE.—£38 per ton d/d.

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PHENOL.—Small lots 6¼d. to 6½d. per lb. in 3-cwt. drums, bulk quantities down to 5½d. per lb., delivery free U.K.

POTASH, CAUSTIC.—LONDON: £42. MANCHESTER: £40.

POTASSIUM BICHROMATE.—Crystals and Granular, 5d. per lb. net d/d U.K. Discount according to quantity. Ground 5¾d. LONDON: 5d. per lb. with usual discounts for contracts. SCOTLAND: 5d. d/d U.K. or c.i.f. Irish Ports. MANCHESTER: 5d.

POTASSIUM CARBONATE.—SCOTLAND: 96/98% spot £28 per ton ex store. LONDON: £31 10s. to £32. MANCHESTER: £29 10s.

POTASSIUM CHLORATE.—3¾d. per lb. export London in 1-cwt. kegs. LONDON: £37 to £40 per ton. SCOTLAND: 99¾/100% powder, £34. MANCHESTER: £36.

POTASSIUM CHROMATE.—6½d. per lb. d/d U.K.

POTASSIUM NITRATE.—SCOTLAND: Refined Granulated £28 per ton c.i.f U.K. ports. Spot £30 per ton ex store.

POTASSIUM PERMANGANATE.—LONDON: 8½d. to 9d. per lb. SCOTLAND: B.P. crystals, 8½d. MANCHESTER: Commercial, 8¼d.; B.P., 8¾d.

POTASSIUM PRUSSIATE.—LONDON: 8½d. to 9d. per lb. SCOTLAND: Yellow spot material, 8½d. ex store. MANCHESTER: Yellow, 8½d.

SALAMMONIAC.—First lump spot, £42 17s. 6d. per ton d/d in barrels.

SODA ASH.—58% spot, £6 per ton f.o.r. in bags, special terms for contracts.

SODA, CAUSTIC.—Solid 76/77° spot £14 10s. per ton d/d station. SCOTLAND: Powdered 98/99% £17 10s. in drums, £18 15s. in casks. Solid 76/77% £14 10s. in drums 70/72% £14 12s. 6d. carriage paid buyer's station, minimum 4-ton lots; contracts 10s. per ton less. MANCHESTER: £12 15s. to £14 contracts.

SODA CRYSTALS.—Spot £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.

SODIUM ACETATE.—£21 to £22 per ton.

SODIUM BICARBONATE.—Refined spot £10 10s. per ton d/d station in bags. SCOTLAND: Refined recrystallised £10 10s. ex quay or station. MANCHESTER: £10 10s.

SODIUM BICHROMATE.—Crystals cake and powder 4d. per lb. net d/d U.K. discount according to quantity. Anhydrous 5d. per lb. LONDON: 4d. per lb. with discounts for quantities. SCOTLAND: 4d. delivered buyer's premises with concession for contracts. MANCHESTER: 4d. less 1 to 3½% contracts, 4d. spot lots.

SODIUM BISULPHITE POWDER.—60/62%, £16 10s. per ton d/d 1-cwt. iron drums for home trade.

SODIUM CARBONATE (SODA CRYSTALS).—SCOTLAND: £5 to £5 5s. per ton ex quay or station. Powdered or pea quality 7s. 6d. per ton extra. Light Soda Ash £7 ex quay, min. 4-ton lots with reductions for contracts.

SODIUM CHLORATE.—2¾d. per lb. LONDON: £29 per ton. MANCHESTER: £29.

SODIUM CHROMATE.—3¾d. per lb. d/d U.K.
SODIUM HYPOSULPHITE.—SCOTLAND: Large crystals English manufacture £9 5s. per ton ex stations, min. 4-ton lots. Pea crystals £15 ex station 4-ton lots. MANCHESTER: Commercial, £9 5s.; photographic, £15.
SODIUM NITRITE.—Spot £19 to £22 per ton d/d station in drums.
SODIUM PERBORATE.—LONDON: 10d. per lb.
SODIUM PHOSPHATE.—£13 to £15 per ton.
SODIUM PRUSSIATE.—LONDON: 5d. to 5½d. per lb. SCOTLAND: 5d. to 5¾d. ex store. MANCHESTER: 5d. to 6d.
SODIUM SILICATE.—140° Tw. Spot £8 5s. per ton d/d station returnable drums.
SODIUM SULPHATE (GLAUBER SALTS).—£4 2s. 6d. per ton d/d. SCOTLAND: English material £3 15s.
SODIUM SULPHATE (SALT CAKE).—Unground Spot £3 15s. per ton d/d station in bulk. SCOTLAND: Ground quality, £3 5s. per ton d/d. MANCHESTER: £3 2s. 6d.
SODIUM SULPHIDE.—Solid 60/62% Spot £10 15s. per ton d/d in drums. Crystals Spot £7 15s. per ton d/d in casks. SCOTLAND: For home consumption, Solid 60/62%, £10 5s.; broken 60/62%, £11 5s.; crystals, 30/32%, £8 2s. 6d. d/d buyer's works on contract, min. 4-ton lots. Spot solid 5s. per ton extra. Crystals, 2s. 6d. per ton extra. MANCHESTER: Concentrated solid, 60/62%, £11; commercial, £8.
SODIUM SULPHITE.—Pea crystals spot, £13 10s. per ton d/d station in kegs. Commercial spot £9 10s. d/d station in bags.
SULPHATE OF COPPER.—MANCHESTER: £16 per ton f.o.b.
SULPHUR.—£12 5s. per ton. SCOTLAND: Flowers, £12 10s.; roll, £12; rock, £9. Ground American, £12 ex store.
SULPHUR CHLORIDE.—5d. to 7d. per lb., according to quality.
SULPHUR PRECIP.—B.P. £55 to £60 per ton according to quantity. Commercial, £50 to £55.
VERMILION.—Pale or deep, 5s. to 5s. 3d. per lb.
ZINC CHLORIDE.—SCOTLAND: British material, 98%, £18 10s. per ton f.o.b. U.K. ports.
ZINC SULPHATE.—LONDON and SCOTLAND: £12 per ton.
ZINC SULPHIDE.—1s. to 1s. 2d. per lb.

Pharmaceutical and Fine Chemicals

ACID, CITRIC.— 1s. 0½d. per lb.
ACID, PYROGALLIC, CRYST.—7s. 3d. per lb. for 28-lb. lots. Resublimed: 8s. 6d. per lb. for 28-lb. lots, d/d.
ACID, SALICYLIC.—B.P. pulv., 1s. 5d. to 1s. 8d. per lb. Technical, 1s. to 1s. 2d. per lb.
ACID, TANNIC, B.P.—3s. 2d. to 3s. 6d. per lb.
ACID, TARTARIC.—1s. per lb.
ASPIRIN.—2s. 7d. to 3s. per lb., including packing and delivery.
IODINE, RESUB., B.P.—20s. 8d. to 26s. per lb.
IODOFORM B.P.—23s. 9d. to 29s. 3d. per lb.
LITHIUM CARBONATE.—5s. 3d. to 5s. 6d. per lb.
LITHIUM CHLORIDE, CRYST.—8s. 3d. per lb.
LITHIUM CITRATE.—5s. 3d. per lb. Powder, 5s. 6d. per lb.
METHYL SALICYLATE.—1s. 4½d. to 1s. 6½d. per lb., including bulk packing and delivery.
POTASSIUM IODIDE, B.P.—17s. 10d. to 21s. 7d. per lb.
QUININE SULPHATE.—2s. 4d. per oz.
SODIUM IODIDE.—19s. 4d. to 23s. 9d. per lb.
SODIUM SALICYLATE.—Powder, 1s. 10d. to 2s. 5d., including packing and delivery; Crystal, 1d. per lb. more.
SACCHARIN.—37s. 6d. per lb. delivery free, packing inclusive, duty paid, subject to usual scale of rebates.
VANILLAN.—Ex clove oil, 16s. to 18s. per lb.; ex Guaiacol, 14s. 3d. to 16s. 3d. per lb., including packing and delivery free U.K.

Intermediates and Dyes

IN the following list of Intermediates delivered prices include packages except where otherwise stated:—

ACID, BENZOIC, B.P. (ex Toluol).—1s. 9½d. per lb.
ACID, GAMMA.—Spot, 4s. per lb. 100% d/d buyer's works.
ACID H.—Spot, 2s. 4½d. per lb. 100% d/d buyer's works.
ACID, NEVILLE AND WINTHER.—Spot, 3s. per lb. 100% d/d buyer's works.
ACID, SULPHANILIC.—Spot, 8d. per lb. 100% d/d buyer's works.
ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.
ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.
BENZALDEHYDE.—Spot, 1s. 8d. per lb., packages extra.
BENZIDINE BASE.—Spot, 2s. 5d. per lb. 100% d/d buyer's works.
o-CRESOL 30/31° C.—£2 6s. 5d. per cwt., in 1-ton lots.
m-CRESOL 98/100%.—2s. 9d. per lb., in ton lots.
p-CRESOL.—34.5° C.—1s. 9d. per lb., in ton lots.
DICHLORANILINE.—2s. per lb.
DIMETHYLANILINE.—Spot, 1s. 6d. per lb., package extra.
DINITROBENZENE.—8½d. per lb.
DINITROTOLUENE.—48/50° C., 8¼d. per lb.; 66/68° C., 9d. per lb.
DIPHENYLAMINE.—Spot, 2s. per lb., d/d buyer's works.
α-NAPHTHOL.—Spot, 2s. 4d. per lb., d/d buyer's works.
β-NAPHTHOL.—Spot, £75 per ton in 1-ton lots, d/d buyer's works.
α-NAPHTHYLAMINE.—Spot, 11½d. per lb., d/d buyer's works.
β-NAPHTHYLAMINE.—Spot, 2s. 9d. per lb. d/d buyer's works.
o-NITRANILINE.—5s. 10d. per lb.
m-NITRANILINE.—Spot, 2s. 7d. per lb. d/d buyer's works.
p-NITRANILINE.—Spot, 1s. 8d. per lb. d/d buyer's works.
NITROBENZENE.—Spot, 6½. per lb.; 5-cwt. lots, drums extra.
NITRONAPHTHALENE.—9d. per lb.
SODIUM NAPHTHIONATE.—Spot, 1s. 9d. per lb.
o-TOLUIDINE.—Spot, 9½d. per lb., drums extra, d/d buyer's works.
p-TOLUIDINE.—Spot, 1s. 9d. per lb., d/d buyer's works.
m-XYLIDINE ACETATE.—3s. 6d. per lb., 100%.

Coal Tar Products

ACID, CARBOLIC (CRYSTALS).—5½d. to 6¾d. per lb. Crude, 60's 1s. 5½d. to 1s. 6½d. per gal. SCOTLAND: Sixties, 1s. 7d. to 1s. 8d.
ACID, CRESYLIC.—99/100, 1s. 7d. per gal.; B.P., 2s. to 2s. 2d.; Refined, 1s. 9d. to 1s. 11d.; Pale, 98%, 1s. 6d. to 1s. 7d.; Dark, 1s. 4d. to 1s. 4½d. LONDON: 98/100%, 1s. 6d. Dark 95/97%, 1s. 4d. SCOTLAND: Pale 99/100%, 1s. 3d. to 1s. 4d.; 97/99%, 1s. to 1s. 1d.; dark 97/99%, 11d. to 1s.; high boiling acid, 2s. 6d. to 3s.
BENZOL.—At works, crude, 8½d. to 9d. per gal. Standard motor, 1s. 3½d. to 1s. 4d.; 90%, 1s. 4d. to 1s. 5d. Pure, 1s. 7d. to to 1s. 8d. LONDON: Motor, 1s. 5½d. SCOTLAND: Motors, 1s. 3½d. to 1s. 4½d.; 90%, 1s. 9½d. to 1s. 10½d.
CREOSOTE.—Standard for export, 4¾d. to 5d. nett per gal. f.o.b. for Home, 3¾d. d/d. LONDON: 3d. to 3½d. f.o.r. North; 4d. to 4½d. London. MANCHESTER: 3½d. to 4½d. SCOTLAND: Specification oils, 3¾d. to 4¼d.; washed oil, 4d. to 4½d.; light, 3¾d. to 4¼d.; heavy, 4½d. to 5d.
NAPHTHA.—Solvent, 90/160, 1s. 4d. to 1s. 5d. per gal.; 95/160, 1s. 4½d.; 90/190, 1s. 1d. to 1s. 2d. LONDON: Solvent, 1s. 1½d. to 1s. 2d.; heavy, 11d. to 1s. 0½d. f.o.r. SCOTLAND: 90/160, 1s. 3d. to 1s. 3½d.; 90/190, 1s. 1d. to 1s. 2d.
NAPHTHALENE.—Purified crystals, £9 10s. per ton in bags. LONDON: Fire lighter quality, £3 to £3 10s.; 74/76 quality, £4 to £4 10s.; 76/78 quality, £5 10s. to £6. SCOTLAND: 40s. to 50s.; whizzed, 65s. to 70s.
PYRIDINE.—90/140, 3s. 9d. per gal.; 90/160, 4s. to 4s. 6d.; 90/180, 2s. to 2s. 6d. SCOTLAND: 90/160%, 4s. to 5s.; 90/220%, 3s. to 4s.
REFINED COAL TAR.—SCOTLAND: 4¾d. to 5d. per gal.
TOLUOL.—90%, 2s. 1d. to 2s. 2d. per gal.; Pure, 2s. 5d. to 2s. 6d.
XYLOL.—1s. 9d. per gal.; Pure, 1s. 11d.

Wood Distillation Products

ACETATE OF LIME.—Brown, £8 per ton. Grey, £11 10s. to £12. Liquor, brown, 30° Tw., 6d. per gal. MANCHESTER: Brown, £8; grey, £11 10s.
ACETIC ACID, TECHNICAL, 40%.—£16 15s. to £18 per ton.
ACETONE.—£63 to £65 per ton.
AMYL ACETATE, TECHNICAL.—95s. to 110s. per cwt.
CHARCOAL.—£7 10s. to £12 per ton.
IRON LIQUOR.—24°/30° Tw., 10d. to 1s. 2d. per gal.
WOOD CREOSOTE.—1s. to 2s. 6d. per gal., unrefined.
WOOD NAPHTHA, MISCIBLE.—3s. to 4s. per gal. Solvent, 3s. 9d. to 4s. 9d. per gal.
WOOD TAR.—£2 to £6 per ton.
BROWN SUGAR OF LEAD.—£32 per ton.

Nitrogen Fertilisers

SULPHATE OF AMMONIA.—During the week the export market has continued quiet and the price remains unchanged. A large number of merchants have now covered their home requirements for the coming season at £5 5s. per ton delivered nearest station in 6-ton lots.
NITRATE OF SODA.—Prices remain unchanged at £9 per ton for imported and £8 16s. per ton for British nitrate, delivered in 6-ton lots.
NITRO-CHALK.—The price remains unchanged at £7 5s. per ton delivered in 6-ton lots.

Latest Oil Prices

LONDON, July 27.—LINSEED OIL was firmer. Spot, small quantities, £16; Aug., £13; Sept.-Dec., £13 10s.; Jan.-April, £14 7s. 6d.; May-Aug., £15 5s. per ton, naked. RAPE OIL was unchanged. Crude, extracted, £28; technical refined, £30 per ton, naked, ex wharf. COTTON OIL was firmer. Egyptian, crude, £21 5s.; refined common edible, £24 5s. and deodorised £26 10s. per ton, naked, ex mill. TURPENTINE was steady. American, spot, 60s. 3d. per cwt.
HULL.—LINSEED OIL.—Spot, closed at £13; July, £12 7s. 6d.; Aug., £12 12s. 6d.; Sept.-Dec., £13; Jan.-April, £13 15s. per ton. COTTON OIL.—Egyptian crude, spot, £22; edible refined, spot, £24; technical, spot, £24; deodorised, £25 10s. per ton, naked. GROUNDNUT OIL.—Crushed extracted, spot, £31 10s.; deodorised, £35 10s. per ton. RAPE OIL.—Crushed/extracted, spot, £27; refined, £28 10s. per ton. SOYA OIL.—Crushed/extracted, spot, £20 10s.; deodorised, £23 10s. per ton. COD OIL, 15s. 6d. per cwt. TURPENTINE.—American, spot, 62s. per cwt. CASTOR OIL.—Pharmacy, spot, 41s. 6d.; first, 36s. 6d.; second, 31s. 6d. per cwt. PALM KERNEL OIL.—Crude, f.m.q., £22 10s per ton, naked.

Inventions in the Chemical Industry

Specifications Accepted and Applications for Patents

THE following information is prepared from the Official Patents Journal. Printed copies of Specifications Accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Specifications Accepted with Date of Application

SYNTHETIC RESINS AND THEIR MANUFACTURE. British Celanese, Ltd. Nov. 7, 1929. 376,839.

COLOURATION OR TREATMENT OF TEXTILE MATERIALS MADE OF OR CONTAINING CELLULOSE ESTERS *or* ETHERS. British Celanese, Ltd. (*C. Dreyfus*). Feb. 11, 1931. 376,797.

POLYMETHYLENEDIGUANIDINE COMPOUNDS AND THEIR PROCESS OF MANUFACTURE. W. H. Lewers (*Anticoman Ges.*). Apr. 7, 1931. 376,806.

PRODUCTION OF ARTIFICIAL RESINS AND PRODUCTS THEREFROM. W. W. Triggs (*Toledo Synthetic Products, Inc.*). Apr. 8, 1931. 376,807.

PHOTOGRAPHIC EMULSIONS. O. Bloch and Ilford, Ltd. Apr. 13, 1931. 376,746.

PROCESS OF MANUFACTURING A WATER RESISTANT, PROTEIN ADHESIVE, AND THE PRODUCT THEREOF. J. T. Sheviin (*Aktiebolaget Lauxein-Casco*). Apr. 13, 1931. 376,748.

ANTI-OXIDANTS FOR THE TREATMENT OF RUBBER. Rubber Service Laboratories Co. Apr. 15, 1930. 376,752.

RECOVERY OF OIL FROM OILY SLUDGES. W. I. Jones, N. Perry, and Imperial Chemical Industries, Ltd. Apr. 13, 1931. 376,756.

MANUFACTURE OF ARTIFICIAL SILK OF HIGH TENSILE STRENGTH FROM VISCOSE. W. W. Groves (*I. G. Farbenindustrie*). Apr. 14, 1931. 376,708.

TREATMENT OF TEXTILE MATERIALS CONSISTING OF OR COMPRISING ORGANIC DERIVATIVES OF CELLULOSE. British Celanese, Ltd., S. A. Welch, W. I. Taylor, and R. H. J. Riley. Apr. 15, 1931. 376,785.

METHOD OF PRESERVING RUBBER AND OTHER OXIDISABLE ORGANIC MATERIALS. Goodyear Tire and Rubber Co. May 24, 1930. 376,818.

CHEMICAL HEATING COMPOSITION, AND METHOD OF PRODUCING SAME. W. W. Triggs (*H. E. Simmons*). Apr. 16, 1931. 376,819.

RECOVERY OF KETONES. Dr. J. Döderlein. May 5, 1930. 376,862.

METHOD OF, AND APPARATUS FOR, EVAPORATING SOLID CARBON DIOXIDE. E. Lukacs. May 22, 1930. 376,863.

PROCESS FOR THE MANUFACTURE OF DI-ALKYL SULPHATES FROM OLEFINES. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. June 20, 1930. 376,925.

PRODUCTION OF SYNTHETIC RESINS FROM ALCOHOLAMINES AND ORGANIC ACIDS. Dr. K. Albert Chemische Fabriken Ges. Sept. 19, 1930. 376,929.

PRODUCTION OF MIXED FERTILISERS. Kali-Forschungs-Anstalt Ges., and Dr. O. Kaselitz. June 25, 1931. 376,934.

MANUFACTURE OF NITRO-AMINODIPHENYL SULPHIDES. Soc. Anon. des Matières Colorantes et Produits Chimiques de St. Denis and R. Lantz. Aug. 8, 1930. 376,961.

PREPARATION OF PIGMENTED BASES OF NITROCELLULOSE CELLULOSE ACETATE AND THE LIKE. W. Butler and Co. (Bristol), Ltd., and Robinson Bros., Ltd. Oct. 13, 1930. 376,989.

MANUFACTURE OF AZO-DYESTUFFS INSOLUBLE IN WATER. I. G. Farbenindustrie. Oct. 6, 1930. 377,024.

TANNING PROCESS. Oranienburger Chemische Fabrik A.-G. Nov 27, 1930. 377,068.

PREPARATIONS FOR KILLING FLIES. I. G. Farbenindustrie. Nov. 27, 1930. 377,069.

PRODUCTION OF XANTHATES. H. D. Elkinton (*Naamlooze Vennootschap de Battaafsche Petroleum Maatschappij*). Dec. 14, 1931. 377,077.

PROCESS FOR REMOVING OXIDES AND GASES FROM MOLTEN ALUMINIUM AND ALLOYS THEREOF. G. Schmidt Ges. Jan. 17, 1931. 377,079.

PROCESS FOR THE PRODUCTION OF FERMENT PREPARATIONS. H. T. Böhme Akt.-Ges. Mar. 11, 1931. 377,128.

PRODUCTION OF POTASSIUM NITRATE. Kali-Forschungs-Anstalt Ges. Sept. 1, 1931. 377,131.

MANUFACTURE OF DOUBLE COMPOUNDS OF THE PYRIDINE SERIES. Society of Chemical Industry in Basle. Mar. 7, 1931. 377,132.

Complete Specifications open to Public Inspection

PROCESS OF PREPARING HYDRATED CITRIC ACID. C. Pfizer and Co. July 15, 1931. 23390/31.

PROCESS OF AND APPARATUS FOR THE THERMAL CONVERSION OF HYDROCARBONS. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. July 14, 1931. 35176-7/31.

PROCESS FOR THE PRODUCTION OF PRIMARY ALCOHOLS. H. T. Böhme Akt.-Ges. July 15, 1931. 7911/32.

MANUFACTURE AND PRODUCTION OF POROUS RUBBER. R. H. Koppel. July 15, 1931. 13457/32.

PROCESS FOR THE WORKING-UP OF AQUEOUS SOLUTIONS OF ORGANIC ACIDS, IN PARTICULAR OF ACETIC ACID. Invention Ges für Verwaltung und Verwertung Chemisch-Technischer Patente Ges. July 17, 1931. 16711/32.

PROCESS FOR THE PRODUCTION OF DRIERS OF IMPROVED STABILITY AND SOLUBILITY. I. G. Farbenindustrie. July 17, 1931. 17407/32.

MANUFACTURE OF ALKALI CARBONATE OR ALKALI HYDROXIDE. A. Mentzel. July 15, 1931. 18684/32.

PROCESS FOR THE PRODUCTION OF ALDEHYDES. H. T. Böhme A.-G. SIDES. H. T. Böhme A.-G. July 13, 1931. 19141/32.

CONVERSION OF HYDROCARBON GASES. Texaco Development Corporation. July 13, 1931. 19591/32.

MANUFACTURE OF SULPHURIC ACID ESTERS SUITABLE FOR USE IN DYEING AND PRINTING TEXTILE FIBRES. Durand and Huguenin A.-G. July 15, 1931. 19058/32.

MANUFACTURE OF AN EMULSION OF WOOL FAT. I. G. Farbenindustrie. July 14, 1931. 19960/42.

PROCESS FOR THE PRODUCTION OF ALDEHYDE. H. T. Böhme A.-G. July 15, 1931. 20044/32.

INSECTICIDES, FUNGICIDES, BACTERICIDES, AND THE LIKE. Grasselli Chemical Co. July 18, 1931. 20063/32.

MANUFACTURE OF ARTIFICIAL PRODUCTS FROM CELLULOSE ESTERS. Kodak, Ltd. July 17, 1931. 20331/32.

TREATMENT OF MIXED ORGANIC ESTERS OF CELLULOSE Kodak, Ltd. July 17, 1931. 20332/32.

MANUFACTURE OF ORGANIC CELLULOSE ESTER MOULDING POWDERS. Kodak, Ltd. July 17, 1931. 20333/32.

MANUFACTURE OF 1-AMINO-10-ANTHRONES AND 1-AMINO-ANTHRAQUINONE COMPOUNDS. I. G. Farbenindustrie. July 17, 1931. 20334/32.

PROCESS FOR PRODUCING ACETYLENE AND POLYMERICS OF THE SAME AND SOOT. Institut für Physikalische Grundlagen der Medizin. July 17, 1931. 20352/32.

Applications for Patents

MANUFACTURE OF CONDENSATION PRODUCTS. J. Y. Johnson (*I. G. Farbenindustrie*). July 13. 19825, 19826.

MANUFACTURE OF ANTHRAQUINONE DERIVATIVES. J. Y. Johnson (*I. G. Farbenindustrie*). July 13. 19827.

MANUFACTURE OF ARTIFICIAL MATERIALS. J. Y. Johnson. (*I. G. Farbenindustrie*). July 13. 19828.

MANUFACTURE OF PIGMENT COLOURS. J. Y. Johnson (*I. G. Farbenindustrie*). July 13. 19829.

SEPARATION OF WEAK ACIDS FROM GASEOUS MIXTURES. J. Y. Johnson (*I .G. Farbenindustrie*). July 15. (Oct. 30, '31.) 20072.

MANUFACTURE OF AMINO COMPOUNDS. J. Y. Johnson (*I. G. Farbenindustrie*). July 15. 20073.

SEPARATION OF WEAK ACIDS FROM GASEOUS MIXTURES. J. Y. Johnson (*I. G. Farbenindustrie*). July 16. 20180, 20181.

REFINING CELLULOSE XANTHO-FATTY ACIDS. L. Lilienfeld. July 15. 20100.

MANUFACTURE OF MATERIALS CONTAINING ETHANOL. L. Lilienfeld. July 15. 20101.

RECOVERY OF CHEMICALS FROM ARTIFICIAL SILK SPUN LIQUORS. J. C. Mather. July 16. 20205.

MANUFACTURE OF CALCIUM HYPOCHLORITE. F. T. Meechan and Imperial Chemical Industries, Ltd. July 15. 20130.

MANUFACTURE OF ORGANIC CONDENSATION PRODUCTS. G. T. Morgan. July 12. 19658.

CENTRIFUGING PROCESS FOR SEPARATING MOTHER LIQUOR FROM CRYSTALS. Raffinerie Tirlemontise Soc. Anon. July 11. (Germany, July 9, '31.) 19597.

MANUFACTURE OF HEAVY METAL COMPOUNDS OF THIO-SUBSTITUTED CARBOHYDRATES. Schering-Kahlbaum A.-G. July 11. (Germany, Aug. 3, '31.) 19617.

MANUFACTURE OF RESINOUS SUBSTANCES. O. J. Silberrad. July 14. 19889.

MANUFACTURE OF INDIGOID VAT DYESTUFFS. Society of Chemical Industry in Basle. July 15. (Switzerland, July 25, '31.) 20104.

MANUFACTURE OF SODIUM NITRATE AND AMMONIUM CHLORIDE. W. Steudemann. July 14. (Germany, July 28, '31.) 19991.

CONVERSION OF HYDROCARBON GASES. Texaco Development Corporation. July 11. (United States, July 13, '31.) 19591.

PRODUCING SOLUBLE SALTS OF BARBITURIC ACIDS. W. W. Triggs (*Abbott Laboratories*). July 11. 19612.

MANUFACTURE OF FUSED SILICA. F. Twyman and S. J. Underhill. July 14. 19972.

MAKING PLASTICISED PITCH COMPOUNDS. United States Pipe and Foundry Co. July 14. (United States, July 29, '31.) 19979.

PRODUCTION OF ORGANIC COMPOUNDS. H. W. Vernon. July 13. 19815.

PRODUCTION OF ANHYDRIDES OF VOLATILE FATTY ACIDS. H. Walter. July 15. 20089.

TREATING NATURAL LAC. X. Winter. July 14. (France, July 27, '31.) 19939.

From Week to Week

THE ARTICLE ON TUNG OIL which was published in THE CHEMICAL AGE, July 16, page 54, was based on information given in a recent issue of the "Bulletin of the Imperial Institute."

MR. WILFRED S. MCKEON, a prominent American chemical manufacturer, with factories at Grensburg, Pennsylvania, who is at present visiting Ireland, is stated to be considering the opening of a branch factory for the manufacture of chemical products in the Irish Free State.

HICKSON AND WELCH, LTD., manufacturers of mirbane oil at Castleford, have appointed as their sole agents for South of England, Charles and Fox, 145 Cannon Street, London, E.C.4, who will carry stocks of mirbane oil in London, and can give immediate attention to any inquiries.

RECENT WILLS include:—Dr. Karl Emil Markel, Ph.D., of 20 Queen's Gate Terrace, Kensington, S.W., for some years technical director of Joseph Crosfield and Sons, soap manufacturers, Warrington £83,563 (net personalty £77,057); Alexander Reid, chemical merchant, sole partner of the firm of Buchanan Brothers and Macintyre, 41 Annette Street, Crosshill, Glasgow, £5,427.

THE DIRECTORS OF BENN BROTHERS, LTD., proprietors of THE CHEMICAL AGE recommend the payment of the following final dividends, less tax, for the year ended June 30: Preference shares, 3 per cent., making 6 per cent. for the year; ordinary shares, 8¾ per cent., making 15 per cent. for the year; deferred shares, 1s. 9d. per share, making 3s. per share for the year.

PLANS HAVE BEEN PERFECTED for a merger of the Armour Fertiliser Works, subsidiary of Armour and Co., and the Virginia-Carolina Chemical Corporation, with the organisation of the Virginia-Carolina Fertiliser Co., to which will be transferred certain assets of the merged concerns. The new company will have an authorised capitalisation of 180,000 shares of 7 per cent. preferred stock, par $100, and 1,000,000 shares of common stock, par $10. Each company will contribute $9,000,000 in cash, inventory, and receivables, together with fertiliser plants, brands, goodwill and equipment.

PROFESSOR J. S. S. BRAME is retiring from the post of professor of chemistry at the Royal Naval College, Greenwich, at the end of the present session and is joining the board of Alexander Duckham and Co., Ltd., of 16 Cannon Street, E.C.4. Professor Brame is a past-president of the Institution of Petroleum Technologists and is chairman of the Standardisation Committee on Methods of Testing, and for some years he has been actually associated with the Petroleum Products Committees of the British Standards Institution.

DR. C. B. MARSON has been appointed head of the chemistry department of the Hull Municipal Technical College. Dr. Marson received his early training as an analytical chemist with Capt. J. A. Foster of Hull, and was for some time in the laboratories of the British Thomson-Houston Co. at Rugby. After war service, he took a course in fuel and metallurgy at the University of Leeds, leading up to the B.Sc. degree, and for two years held the gas research fellowship of the Institution of Gas Engineers, working on the influence of inorganic constituents on the properties of coke. He was then appointed on the staff of the Joint Research Committee of the University of Leeds and the Institution of Gas Engineers, from which he proceeded to the position of chief chemist to the Northern Coke Research Committee.

WITH THE PERMISSION of the Board of Trade, the makers of "Germ" oils have changed their name from Henry Wells Oil Co., Ltd., to Germ Lubricants, Ltd. During the first six months of this year, the sales of "Germ" oils increased 17 per cent. over the sales for the corresponding period of last year—a remarkable achievement considering the acute depression in all parts of the world—and the sole makers and suppliers are changing their name so that it will be associated more closely with their chief product. There has been no alteration in the management of the business, which was commenced by Mr. Henry M. Wells, the present chairman, in 1898. The other directors are Messrs. W. Priestnall, B. D. Martin, J. E. Southcombe and J. H. Wells. The company's works are at Salford, and their head offices are at Salisbury House, London, E.C.2.

G.W.B. ELECTRIC FURNACES, LTD., and Wild-Barfield Electric Furnaces, Ltd., have entered into a working arrangement with Industrie-Elektroofen G.m.b.H., Cologne, whereby the two former firms will manufacture and sell in Great Britain electric furnaces under the Russ patents. The Russ electric furnaces, which are well known in Germany and France, and for which there is an increasing demand in Great Britain, include induction type melting furnaces, arc furnaces, ferrous and non-ferrous continuous strip heat-treatment plant complete with winding gear, etc. The agreement concluded between the three companies, togther with that made some time ago with the Hevi Duty Electric Co. of Milwaukee, now places G.W.B. Electric Furnaces, Ltd., and Wild-Barfield Electric Furnaces, Ltd., in a position to manufacture and supply practically every type of electric furnace required for any industrial purpose.

SIR C. V. RAMAN, D.Sc., F.R.S., Palit Professor of Physics, University of Calcutta, who received the degree of LL.D. at Glasgow University in 1930-31, will be honoured with a degree *honoris causa* at a special convocation of Paris University to be held on November 5.

IN THE CHANCERY DIVISION on Monday, Mr. Justice Eve approved of a scheme for the reduction of the capital of the West Ham Chemical Works, Ltd., from £11,000 to £1,700 by the return of capital to the first and second preference shareholders, there being sufficient liquid assets.

MR. JUSTICE LUXMOORE, in the Chancery Division on July 21, reserved his judgment in the action over the patents of the Aktiengeselischaft fur Industrie-Gasverwertung, a German company, which are disputed by the British Oxygen Co., Ltd. The case was reported in THE CHEMICAL AGE of July 16 and 23.

THE IRISH FREE STATE Department of Agriculture are considering plans for the establishing of dried milk products factories throughout the country and banning the importation into the Free State of similar produce. There are already two dried milk factories in the Free State and both these are understood to be progressing well. Should the Department eventually decide on this plan it is believed that they will also establish a factory for the manufacture of casein and casein products.

THE SANCTION OF THE COURT to the proposed reduction of the capital of the Chemical and Metallurgical Corporation, Ltd., having been obtained, the board now confirms the undertaking given by the chairman to the preference shareholders that they should be granted a five-year option on 200,000 ordinary 2s. shares at par. All preference shareholders registered on June 21 will receive certificates entitling them, at any time on or before June 30, 1937, to take up at par one ordinary 2s. share in the reorganised capital in respect of each preference share held.

THE UNIVERSITY OF LONDON has awarded the degree of Ph.D. in engineering metallurgy to Mr. M. B. Thompson. The thesis submitted by Mr. Thompson was based on work carried out at the Huddersfield Technical College under the direction of Mr. H. H. Gray. This work was the subject of a grant by the Department of Scientific and Industrial Research to Mr. Gray and was concerned with the action of molecular nitrogen on iron and its alloys. Dr. Thompson is now chief lecturer in the Department of Chemistry and Metallurgy at Rotherham Technical College.

BRISTOL MANUFACTURERS, LTD., of Bedminster Bridge, Bristol, an important branch of whose business is the manufacture of edible and photographic gelatines, are to clear an extensive site in order to erect a new modern factory. The recent fire at their factory destroyed the gelatine factory. The new factory, equipped with the latest machinery, is to be built on a site about 200 ft. by 150 ft., on adjoining land. Mr. Percy R. Edwards, secretary and general manager, has inspected similar factories in France and Germany, and he believes that the new plant will be as good as any throughout the world. It is hoped that the new factory will be ready by next January.

THE FOURTEENTH EXPOSITION OF CHEMICAL INDUSTRIES will be held in New York, February 27 to March 4, 1933, when three entire floors at Grand Central Palace will be devoted to the exhibits showing the newest developments in raw materials, machinery, and manufactured products. The exhibitors will represent over forty American industries which are classified as "chemical." This exhibition, which is held every two years, provides an opportunity, not available elsewhere in the world, for studying the latest designs in a vast array of interesting equipment, and for comparing competitive products side by side. The 1931 exhibition was attended by 105,000 visitors.

FIVE UNITED STATES RESEARCH WORKERS in chemistry will receive aid from a fund provided by the Rockefeller Foundation, according to an announcement by the Committee on Awards of the National Research Council. John G. Aston, Pennsylvania State College, is carrying out research on heat capacities of simple organic nitrogen compounds; W. L. Beuschlein, University of Washington, is studying the hydrogenation of coal in various dispersion media; Barnett F. Dodge, Yale University, is investigating the solubility of gases in liquids at high pressures, and equilibria in organic chemical reactions at high pressures; E. C. Gilbert, Oregon State College, the thermo-chemistry of hydrazine and its compounds; Robert Taft, University of Kansas, the micro-structure of metals (copper and silver) deposited in the presence of addition agents. The awards of the National Research Council are intended to aid in research projects and are not for fellowship stipends or other personal support. Preference is given to small grants to workers in institutions whose resources for research work are limited. The committee will meet in November to consider further applications for grants-in-aid, which must be made before October 15.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

Mortgages and Charges

[NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.]

MAGADI SODA CO., LTD., London, S.W. (M. 30/7/32.) Registered July 15. Trust Deed dated July 14, 1932, varying conditions re'ating to £425,700 debentures outstanding under Trust Deed dated March 3, 1925; charged as in original deed. *£425,700. June 9, 1932.

MANGER (J.) & SON, LTD., London, E., salt and soda manufacturers. (M. 30/7/32.) Registered July 15, three Land Registry charges, to Barclays Bank, Ltd., securing all moneys due or to become due to the Bank; charged on properties at Bow, &c. *£5. May 13, 1932.

Companies Winding Up

THE BRITISH-NETHERLANDS ARTIFICIAL SILK CO., LTD. (C.W.U. 30/7/32.) Winding-up order, July 18.

Companies Winding Up Voluntarily

BROWNLAC, LTD. (C.W.U.V. 30/7/32.) By special resolution, July 15. Mr. C. F. Bland, 1 Broad Street Place, Finsbury Circus, London, E.C.2, appointed liquidator.

Notice of Dividend

THE J. M. NEWTON VITREO-COLLOID (1928), LTD. First dividend, 10s. per £ payable August 15, at the office of the liquidator, 11 Waterloo Place, S.W.1.

Chemical Trade Inquiries

Abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

Belgium.—An agent established at Liège wishes to obtain the representation of United Kingdom manufacturers of pharmaceutical products, alkaloids, essences and raw materials for the manufacture of perfumes. (Ref. No. 118.)

Canada.—A manufacturers' agent at Vancouver is desirous of obtaining a United Kingdom agency for dry colours, especially ochres, red oxides, umbers, siennas, etc., on a commission basis for the province of British Columbia. (Ref. No. 107.)

Egypt.—The Commercial Secretary to the Residency, Egypt, reports that the Egyptian Department of Public Health is calling for tenders to be presented in Cairo by August 25, 1932, for the supply of 9,000 kilos of liquor hydrogen peroxide (10 vols) in bottles and 12,750 tins of Cataplasma Kaolin Co., B.P.C. (Ref. No. F.X. 1548.)

New Zealand.—A Wellington agent at present in this country desires to represent United Kingdom manufacturers of lacquers and non-splinterable or laminated glass. (Ref. No. 116.)

South Africa.—The British Trade Commissioner at Johannesburg reports that the Stores Department of the South African Railways and Harbours is calling for tenders (Tender No. 2069), to be presented in Johannesburg by September 19, 1932, for the supply of 6½ tons of anti-friction grease. (Ref. B.X. 7376.)

South Africa.—The British Trade Commissioner at Johannesburg reports that the South African Railways and Harbours Administration is calling for tenders (Tender No. 2070), to be presented in Johannesburg by September 19, for the supply of disinfectant fluid which will be required during the period January to December, 1933. (Ref. F.X. 1539.)

Company News

Usti (Aussig) Chemical Union.—A dividend of 10 per cent. for 1931, against 20 per cent. last year, is announced.

Major & Co.—For the year ended March 31, 1932, the report shows debit in profit and loss account of £2,127, which it is proposed to carry forward. In the previous year there was a profit of £13,739.

Benzol and By-Products.—After making full allowance for depreciation, report for year to September 30 shows loss of £15,351 (against £2,164). Debit balance brought forward is thus increased to £123,575.

Travancore Rubber.—Loss for year 1931, after allowing for depreciation of £1,535, was £3,366 (against £3,802), which has been carried to appropriation account. Since May, 1931, rubber area has been on care and maintenance basis. Crop harvested during five months of tapping was 211,328 lb.

Electro Chemical Processes.—For the fifteen months ended March 31, 1932, the report states that there was a loss of £29,521, which has increased the debit balance on profit and loss account to £89,529. This compares with a loss of £38,454 for the twelve months ended December 31, 1930. The greater part of the loss, it is stated, was incurred prior to the date on which organisation became effective. The accounts which have been prepared by the auditors for April, May and June, 1932, show that in each department the trading loss has been converted into the trading profit. These trading profits taken together are not yet sufficient to cover all expenses other than manufacturing expenses, but the net loss for the three months has been brought down to £2,000.

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